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VARIATIONS IN REFRACTION OF THE VISUAL AND EXTRA-VISUAL PUPILLARY ZONES*

A skiascopic study

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Under cycloplegia, 277 normal eyes were studied as to the refractive comparison between the visual and extravisual zones, and between the different quadrants of the same eye. The variations found were classified chiefly as "symmetrical" positive aberration, "symmetrical" negative aberration, and mixed aberration (scissors movement). The type and degree of aberration are not dependent on the kind or amount of refractive error. Positive aberration is the most frequent, especially in adults; but negative aberration and the marked asymmetry of mixed aberration are met with in more than forty percent of children. The crystalline lens is a most important factor in producing the aberrations of the eye. These aberrations must be reckoned with in ophthalmoscopy, and objectively and subjectively in applied refraction. They should be studied routinely by means of skiascopy.

Although skiascopy has been generally accepted as the most accurate objective method of measuring ametropia, it has been applied to the determination of the variations in the refraction of the visual and extravisual zones of the eye by only a few observers.

Jackson [1, 2, 3, 4, 5, 6] has repeatedly pointed out the practical and scientific value of studying by skiascopy all the pupillary zones; and the report of the special committee[7] of which he was a member stated that "skiascopy measures the macular area and also the refraction of the extravisual zone as is possible to measure it in no other way". Lindner[8] has also called attention to the necessity of studying the behavior of the light and shadow in the different pupillary areas, and compares the disturbance produced by these variations with the difficulty which the corneal reflex causes the beginner in ophthalmoscopy.

The fact that, in a dilated pupil eight millimeters in diameter, the extravisual zone has an area about three times that of the visual zone, and that the visual zone is the only part of the dioptric system having a refraction sufficiently uniform to give accurate foveal vision, should emphasize the importance of determining the types and magnitude of the refractive differences in the dilated pupil, and their effects on our accuracy in skiascopy and the subjective tests at the trial case.

These variations are due chiefly to the phenomena of positive and negative aberration. Positive aberration, otherwise called spherical aberration because it is common to all spherical refracting surfaces, is that condition in which the peripheral portions of the optical system are more strongly refracting, or myopic, than the central paraxial zone, so that the peripheral rays intersect the axial ray at focal points nearer to the surface than the focus for the central rays. In negative aberration the reverse is true; the peripheral rays have focal distances greater than those of the central rays, i.e., the peripheral zones are hyperopic with respect to the central zone.

*Thesis offered to the faculty of ophthalmology of the Graduate School of Medicine of the University of Pennsylvania, in partial fulfilment of the requirements for the degree of master of medical science for graduate work in ophthalmology. Also from the department of ophthalmology of the University of Colorado.

These aberrations produce characteristic skiascopic appearances which were first recognized and described by Jackson[1] in 1885. It is true that Bowman[9], in 1862, using the ophthalmoscope at a distance, was able to detect conical cornea because of the high degree of negative aberration present in this condition. However, neither he nor Lytton Forbes[10], who in 1880 gave a detailed description of the various forms of light and shadow in the pupil, recognized the aberrations of the eye. In 1888, Jackson[2] measured skiascopically the symmetrical aberration in one hundred eyes. Brudzewski[11] has also determined the aberration in a certain number of eyes in this way. More recently, Pi[12] studied the quadrants of the peripheral zone in fifty eyes.

The material of this investigation comprises 300 eyes, 277 of which were selected as representing normal eyes, i.e., eyes showing no pathology of the dioptric media and surfaces. In the vast majority, vision of 6/6 or better was obtained. Of the 141 cases, 117 or 83 per cent were under twenty years of age. All the cases were studied under cycloplegia, atropin being used in children under thirteen years of age, and homatropin, instilled under our supervision, in the older patients. Only two patients were studied without cycloplegia, but as they presented lenticular changes they are not included in this series of normals.

The technique was carried out under the conditions of accuracy set forth by Jackson[4]. Lindner[8] was also consulted. The plane mirror of two and one-half millimeters aperture was used at a working distance of one meter. A point-source of bright focussed light was furnished by the Shields[13] lamp with a three millimeter aperture between the lenses (plus 20 D. posterior and plus 16 D. anterior), thus producing a narrow beam focussed 6.25 centimeters in front of the anterior lens, and of a diameter about equal to that of the retinoscope one meter from the lamp.

At the outset of the examination the lamp was placed one meter from the mirror, in order better to discern the appearances of small amounts of regular astigmatism, but for the final check-up of the point of reversal for the visual zone and the quadrants of the extravisual zone it was brought within ten centimeters of the mirror. This adjustment of the light is of course a refinement, but it is conducive to the accuracy desired. It will be noted, however, that this technique is in no way more elaborate than the routine practice in the office or clinic.

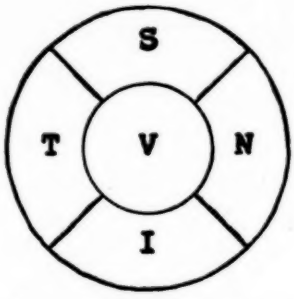

Fig. 1 (Stine). The visual zone (V) and the arbitrary extravisual quadrants (S, I, T, N) of the dilated pupil.

During the measurement of the visual zone and the quadrants of the vertical meridian the patient fixed the edge of the mirror, and he looked directly at the sight-hole while the nasal and temporal quadrants were studied. To make sure that the accommodation was not active, the other eye, with its full correction before it, was repeatedly examined for any change in the refraction of the visual zone.

The approximate relations of the area of the visual zone and the peri-

pheral quadrants are shown in figure 1. Of course the size of the visual zone varies considerably in different individuals, but it corresponds approximately to the area of the undilated pupil. In general the visual zone appears smaller when positive aberration is present, and larger when negative aberration predominates.

The point of reversal for the principal meridians of the visual zone once determined, the correcting cylinder was left in place, and the convex sphere was reduced or concave spheres were added, in the case of positive aberration, and vice versa in negative aberration, until the pupil was filled with a light area of similar movement. Then the sphere (plus the effect of the cylinder) which just caused reappearance, in the quadrant being measured, of the small marginal light-crescent having a movement opposite to and separated from that of the large central glow was considered the measurement of the refraction of that particular quadrant. The difference between this value and the refraction of the visual zone in the same meridian gives the degree of total aberration in diopters.

The variations were grouped as (1) positive aberration, and (2) negative aberration, according to the predominance of the one or the other in the skiascopic picture. However, the presence of positive aberration in one quadrant, and of negative aberration in the opposite quadrant, under certain circumstances, produces a characteristic appearance known as "scissors movement", so that eyes manifesting it were grouped separately as (3) mixed aberration. As it is chiefly the superior and inferior quadrants that differ in this respect, this group was subdivided according to the type of aberration predominating in the nasal and temporal quadrants; and there were a few cases in which these quadrants were also dissimilar.

The data of the three major groups and subgroups are presented in tabular form, showing the maximal, minimal, and average difference, in diopters, between the refraction of each peripheral quadrant and that of the visual zone, and the greatest and least asymmetry of aberration found in an individual eye. The plus and minus signs indicate positive and negative aberration respectively.*

As table 1 indicates, the nasal and superior quadrants are the most highly refractive, the temporal quadrant is only slightly less so, and the inferior quadrant is the weakest of the four. The superior and inferior quadrants show the greatest range of variation, 9.75 and 9.50 D. respectively, while the nasal quadrant shows the least, 7.00 D. The data also demonstrate the great extent to which the quadrants may vary among themselves and from the visual zone in an individual eye; as much as 7.00 diopters between adjacent quadrants, and 7.50 diopters between the central visual zone and a quadrant of the extravisual zone. No eye in this large group showed perfect symmetry.

However, positive aberration presents the least confusing skiascopic appearance even when the quadrantal asymmetry is marked. As the point of reversal for the visual zone is approached, the positive aberration of the more regular pericentral area comes into play, so that the bright peripheral ring is usually complete and distinctly separated from the duller red central glow by the intermediate ring of shadow.

When the point of reversal for the center is almost reached, the outline and ill defined "with" movement of the feeble central glow are enhanced by the appearance of a faint crescentic shadow (the remnant of the formerly well defined intermediate ring of shadow) between the broad peripheral ring and the small central light area on the side away from which the mirror is rotated. This "crescentation" (Lindner) is also helpful in checking the accuracy of the cylinder and axis, for if these are correct, the crescentic shadow will be of the same breadth and on the side exactly opposite the direction of rotation of the mirror.

* See definitions of positive and negative aberration on page 101.

Table 1.

POSITIVE ABERRATION: THE MAXIMAL, MINIMAL, AND AVERAGE DIFFERENCES BETWEEN THE PERIPHERAL QUADRANTS AND THE VISUAL ZONE; AND THE GREATEST AND LEAST ASYMMETRY OF ABERRATION IN ONE EYE.

Quadrant	Average	Maximum	Minimum	Asymmetry	
				greatest	least
Superior	+2.72	+7.50	—2.25	+6.25	+3.87
Inferior	+1.38	+5.75	—3.75	0	+3.62
Nasal	+2.73	+7.00	0	+4.00	+3.62
Temporal	+2.52	+7.25	—0.75	—0.75	+3.62

Table 2.

NEGATIVE ABERRATION: THE MAXIMAL, MINIMAL AND AVERAGE DIFFERENCES BETWEEN THE PERIPHERAL QUADRANTS AND THE VISUAL ZONE; AND THE GREATEST AND LEAST ASYMMETRY OF ABERRATION IN ONE EYE.

Quadrant	Average	Maximum	Minimum	Asymmetry	
				greatest	least
Superior	—2.76	—6.25	0	—5.25	—1.50
Inferior	—2.76	—6.25	—0.50	—5.75	—1.50
Nasal	—1.66	—4.00	+2.25	+1.00	—1.50
Temporal	—1.64	—4.00	+2.25	—0.25	—1.50

Table 3.

MIXED ABERRATION (SCISSORS MOVEMENT): THE AVERAGE DIFFERENCES BETWEEN THE PERIPHERAL QUADRANTS AND THE VISUAL ZONE IN THREE SUBGROUPS; AND THE GREATEST AND LEAST ASYMMETRY OF ABERRATION IN EACH GROUP AS A WHOLE; AND THE MEAN DIFFERENCES.

Quadrant	(A) Positive aberration average	(B) Negative aberration average	(C) Mixed aberration average	Asymmetry greatest	Asymmetry least	Mean differences entire group
Superior	+2.02	+2.11	+1.52	+2.00	+1.00	+1.94
Inferior	—1.13	—1.88	—1.41	—6.00	—1.50	—1.34
Nasal	+1.85	—1.28	—0.10	+3.00	+1.00	+0.77
Temporal	+1.41	—1.08	+0.38	—5.00	+1.00	+0.69

In the higher degrees of positive aberration (4 to 6 D.) as much as one diopter of regular astigmatism may be masked by the broad peripheral ring. The astigmatic band does not extend entirely across the pupil as is usually the case, so that one must carefully study the small central light area, looking for an oblong block of light separated from the bright peripheral ring by a circle of shadow better defined at the sides than at the ends of the axis.

On the other hand, marked positive aberration may give a hint of the presence and axis of regular astigmatism before the characteristic band has appeared. This occurs when the aberration is quite symmetrical and of an amount about equal to the astigmatism, as the following case illustrates. The eye in question showed at first glance the large light area moving with the mirror entirely across the pupil in both meridians. With a plus 1.50 sphere before the eye the small light crescents appeared in the extreme periphery of the superior and inferior quadrants slightly away from 90 degrees; the quadrants of the horizontal meridian as yet showed no aberration. As the point of reversal for the vertical meridian was approached, the band at 105 degrees and positive aberration in the nasal and temporal quadrants appeared. The final result was +4.00 sphere +3.25 cylinder axis 106 degrees, and with correcting cylinder in place the aberration measured 3.75 D. in the vertical quadrants and 3.25 D. in the horizontal.

Negative aberration (table 2) is most pronounced in the quadrants of the vertical meridian. The two quadrants of the same meridian are seen to be quite similar in their average, maximum, and minimum amounts of aberration, and the range of variation is about the same for all quadrants. A

considerable degree of asymmetry is also noted in this type of aberration, but negative aberration is, on the whole, less asymmetrical than positive aberration; eyes showing quadrantal asymmetry to the extent of one diopter or less were twice as frequent in the group of negative aberration. However, the change in refraction from the central zone to the periphery is less regular; positive aberration may be present in the paracentral area, especially in the superior quadrant. This positive aberration is slight in amount and difficult to measure, and in a study such as this only the negative aberration predominating in the periphery could be accurately determined.

This condition presents a skiascopic appearance as disturbing as the marked asymmetry of mixed aberration. The contrast of light and shadow, and the opposite movement of periphery and center—working from the side of undercorrection in hyperopia (with which it was most frequently found), and vice versa in myopia—are lacking. As one approaches the point of reversal for the visual zone, the paracentral positive aberration adds an irregular glow moving opposite to and between that of the periphery and center. It is difficult to resolve the different light areas, and the most satisfactory way to determine the refraction of the visual zone in these cases is Jackson's[4] method of working from both sides; one-fourth diopter overcorrection in hyperopia, or undercorrection in myopia, is usually sufficient to produce a larger, more brilliant central glow whose movement is distinctly against the mirror, while the dull red glow and "with" movement of the periphery persist.

The oustanding feature in the analysis of scissors movements (table 3) is the fact that the asymmetry producing these appearances is in the superior and inferior quadrants, the superior quadrant being the more myopic. The superior quadrant was hyperopic in but four eyes of this group, and in these eyes the scissors-like movement was not so characteristic or disturbing. The average difference between these two quadrants is about 3.25 diopters, which is not so marked as might be expected. However, it seems that the typical movement is dependent not so much upon the degree of difference in aberration as upon the gradual increase, from center to periphery, of positive aberration in one quadrant and of negative aberration in the opposite.

An illustration of this fact may be had in an emmetropic eye, in which the superior quadrant showed positive aberration of 3.50 D., and the inferior quadrant negative aberration of 1.75 D., and in which scissors-like movement was not at all apparent. This eye was classed according to the aberration of three quadrants, as positive.

The degree of negative aberration in the inferior quadrant seems to be in direct proportion to the type of aberration in the quadrants of the horizontal meridian, being greatest when these quadrants are negative, least when positive, and average when they are mixed. The relationship of the positive aberration in the superior quadrant to the type of aberration in the nasal and temporal quadrants is not so clear, but in a few eyes in which these quadrants showed negative aberration the extreme periphery of the superior quadrant had negative aberration of about the same amount. This may have been the case in all the eyes in subgroup (B) of table 3; positive aberration produces a more brilliant glow than negative aberration, and so may mask it.

Mixed aberration is, of course, the highest type of peripheral asymmetry found in the normal eye; in the case cited in the table, the superior and nasal quadrants differed from the inferior and temporal to the extent of eight diopters. The effect was a double scissors movement, the blades of light approaching and separating in both meridians. There was not a trace of regular astigmatism in the visual zone.

Usually the characteristic scissors effect is not fully apparent until one is near the point of reversal for the visual zone, the skiascopic appearance being that of the type of aberration predomi-

nating. The greatest difficulty is with the accurate location of the visual zone that the patient will use, for, as Jackson[4] points out, "the observer's eye is always at or near the point of reversal for the portion of the pupil occupied by the intermediate zone of feeble illumination" where the opposing light areas meet and separate; and it requires a nicety of judgment to choose the lens which will place this area of shadow in the proper visual zone. I have not found these eyes to be more astigmatic than is usual, but with astigmatism of one-half diopter or more the characteristic band which is best corrected with a cylinder is usually produced before the point of reversal for the other meridian is reached.

The following case illustrates the difficulty in (and also the possibility of) locating accurately the visual zone. Skiascopy indicated either —0.75 sphere +1.50 cylinder axis 100 degrees, or —0.50 sphere +1.25 cylinder at the same axis. The trial case finding was similar, —0.25 sphere +1.00 cylinder axis 95 degrees, vision equals 6/6 plus, and the final result of the postcycloplegic examination was —0.25 sphere +0.75 cylinder axis 105 degrees, vision equals 6/5. Ordinarily, in the routine of a busy clinic, the postcycloplegic examination of a child would not have been made, had not skiascopy indicated the condition.

Of the 277 eyes, there was not one in which some degree of aberration was not present. Positive aberration was seen in 183, or 66 percent. Negative aberration was present in 46, or 16.5 percent, which is considerably more frequent than was found by Jackson[2] or Pi[12] (9 and 2 percent respectively). Mixed aberration showed a slightly higher incidence, occurring in 48 eyes or 17.5 percent. The positive, negative, and mixed aberration of the last group showed a similar proportion of incidence; positive aberration in the quadrants of the horizontal meridian occurring in 28 eyes or 62.5 percent; negative in 9 eyes or 14.5 percent; and mixed in 11 eyes or 23 percent.

In general, the four quadrants in the groups of so-called pure positive and pure negative aberration showed similarity of type, there being but a few eyes in which one of the quadrants, most frequently the inferior in the positive group, and the nasal in the negative group, differed in sign from the other three. In the group of positive aberration there were only sixteen eyes in which any one of the quadrants showed no aberration; the inferior quadrant had the same refraction as the visual zone in twelve eyes, the superior in two, and the nasal and temporal quadrants in one each. In the negative group, aberration was likewise absent in one quadrant (the superior), in but one eye. And the nasal and temporal quadrants showed no aberration in but three eyes of the mixed group. It is evident that aberration of one form or the other is only very rarely absent, and then chiefly in the inferior quadrant.

It has been remarked that eighty-three percent of the subjects in this investigation were under twenty years of age; and the comparatively large proportion of cases of negative and mixed aberration has been noted. Table 4 represents an attempt to correlate these facts; it shows the distribution of the three main types of aberration in different age groups, i.e., over and under twenty and thirteen years of age.

TABLE 4. AGE AND ABERRATION

	Over 20 years	Under 20 years	Over 13 years	Under 13 years	Total
Positive aberration, number of cases	21	71	40	52	92
Negative aberration, number of cases	0	25	5	20	25
Mixed aberration, number of cases	3	21	6	18	24
Totals	24	117	51	90	141

We find that, while positive aberration is the most frequent type especially in adults, negative aberration and mixed aberration (scissors movement), both of which present the most disturbing skiascopic appearances, are met

with, on the whole, in more than forty percent of children; in fact negative aberration was not found in any patient over nineteen years of age, and scissors movement was seen in only three over twenty years. It seems that the younger the child the more are we liable to encounter these difficulties, all of which is significant, as it is in children that we are most dependent on skiascopy.

Although the exposure of more of the periphery of the cornea by a widely dilated pupil might account for negative aberration or for higher degrees of quadrantal asymmetry, the size of the pupil in the eyes of the different groups was not found to be of definite significance, the most frequent diameter being eight millimeters in each group. The maximum size of the pupil was nine millimeters in positive and mixed aberration, and eight and one-half in negative aberration. The minimum pupillary diameter was six millimeters in each group.

However, analysis of the large group of eyes manifesting positive aberration discloses the fact that adults, whose average pupillary diameter was 6.7 millimeters, showed 1.25 diopters more aberration than children, in whom the average pupil was 7.7 millimeters. Furthermore positive aberration was more asymmetrical in children; quadrantal asymmetry of less than one diopter was found in sixty-six percent of the cases over twenty years of age, and in only twenty-three percent of those under twenty. No relation was found between the degree or asymmetry of aberration and the size of the pupil in the children of this group.

No conclusions could be drawn from the distribution of the types and amounts of the refractive error in the different groups, except that compound hyperopic astigmatism (C.H.As.) predominated as usual. As table 5 shows, there is no ground for the supposition that negative aberration and myopia might be interdependent. The degree or type of aberration is not dependent on the refractive error except in pathological cases, such as conical cornea and nuclear cataract, in which a high degree of negative aberration is present.

The presence of positive aberration in the large majority of eyes, as well as its quadrantal distribution, is at variance with the ophthalmometric findings for the curvatures of the anterior surface of the cornea. Gullstrand[14], using a photographic method, found that this surface in a typically normal eye was approximately spherical in the central optical zone of about four millimeters diameter, and that the periphery was considerably flattened, more so in the superior and nasal quadrants than in the inferior and temporal portions. Gullstrand's findings are corroborated by the work of Sulzer[15] and Eriksen[16] on a large number of eyes. Moreover, this flattening is more irregular in the superior and inferior quadrants, owing probably to the pressure of the lids. Thus the spherical optical zone would produce positive aberration, and the peripheral portions would show negative aberration proportional to the flattening.

The obliquity of incident rays parallel to the ophthalmometric axis, or to the line of fixation (as is practically the case in skiascopy) decreases considerably the amount of negative aberration, but does not neutralize it. Hence it is probable that the lens is responsible for positive aberration resultant for the entire eye, notwithstanding the work of Besio[17], who determined, by the most accurate ophthalmometric measurements so far obtained, that the peripheral portions (three millimeters from the axis) of the lens in the living eye were also considerably flattened.

The measurements of positive aberration determined by the present investigation and by that of Pi[12], contrary to the findings for the cornea, suggest that the decentration of the lens downward and outward from the ophthalmometric axis may be a factor, or that the lens possesses asymmetry opposite to that of the cornea. Gullstrand[18] believes that the large amount of positive aberration in the optical zone is due in large measure to the heterogeneous medium of the lens.

With regard to the presence of negative aberration and marked quadrantal asymmetry in so large a proportion of children, it seems probable that these are due in part to the external pressure of the lids on the young and less rigid tissues, and to the internal forces of growth, producing more marked irregularity and flattening of the periphery of the cornea. However, the growth of the cornea is almost concluded in the second year of life, and its full size is practically attained by the time of puberty (Salzmann), so that we are led to the assumption that the periphery (cortex) of the lens in the child has a lower dioptric power, compared with the central portion (nucleus), than in the adult. Freitag, quoted by Butler[19], is of this opinion, and Butler[19] states that "in some juvenile lenses the peripheral zones take a reverse curve towards the equator."

The asymmetry producing scissors movement is probably due to obliquity of the lens (Jackson) caused by tilting, which Thorington[20] suggests may be congenital or due to excessive use of the eyes while reclining.

With regard to the refraction of the extreme peripheral portions of the eye, the following case of bilateral coloboma of the iris in a girl of thirteen years is of interest. The dilated pupil measured 7.5 millimeters in its greatest horizontal diameter and 8.5 millimeters vertically, and the coloboma, although not complete, was sufficiently extensive to permit biomicroscopic study of the anterior zonular fibers and of the extreme periphery of the lens, which was not notched. Coloboma of the ciliary body was not demonstrated. Three diopters of positive aberration were present in all the quadrants within the normal pupillary limits, while the area within the coloboma showed ten diopters of negative aberration which was sharply demarcated from the zone of positive aberration just above. The other eye, in which the coloboma did not extend quite so far peripherally, showed seven diopters of negative aberration in the coloboma, and about three diopters of positive aberration in the pupil above. Subsequent study of the accommodation with a dilated pupil showed that the visual and extravisual zones within the normal pupillary limits became uniformly myopic, but there was no change in the negative aberration in the coloboma.

The various forms of pathological irregular astigmatism present great difficulties, but skiascopy is of assistance in these cases as long as some light reflex can be seen. In some instances, only the general character of the refraction of the entire pupillary zone can be determined, while in other cases several zones are available for skiascopic and visual purposes.

In a case of conical cornea in which the refraction of the summit of the conus was determined to be —5.75 sphere +3.50 cylinder axis 180 degrees, this cylinder being chosen because it gave the most uniform "wheel motion" of the peripheral light area, the absolute refraction of the superior quadrant required +2.50, the inferior —.50, and the nasal and temporal quadrants +2.00. The superior quadrant had the largest and most uniform area, as the apex of the conus was decentered downward. Results at the trial case with atropin

TABLE 5. TYPES OF AMETROPIA AND ABERRATION

	E.	H.	H.As.	C.H.As.	M.	M.As.	C.M.As.	Mixed As.
Positive aberration	1	29	8	111	5	4	13	12
Negative aberration	0	11	3	19	0	0	4	9
Mixed aberration	0	2	2	30	3	0	7	4
Totals	1	42	13	160	8	4	24	25

Note: E. = emmetropia; H. = hyperopia; H.As. = hyperopic astigmatism; C.H.As. = compound hyperopic astigmatism; M. = myopia; M.As. = myopic astigmatism; C.M.As. = compound myopic astigmatism; Mixed As. = mixed astigmatism.

and pilocarpin were contrary and very unsatisfactory, but the manifest refraction gave vision of 6/6 with —0.25 sphere+2.50 cylinder axis 180 degrees, which suggests that the visual zone was just above the apex as indicated by skiascopy.

In a case of advanced and large nuclear cataract, the narrow periphery showed fourteen diopters of negative aberration. The patient would not accept the correction for the extreme periphery (+6.50 sphere), choosing rather the —7.50 sphere for the center which gave him vision of 6/60.

This is in accord with Szily[21], who found in 30,328 cases only sixteen in which different lenses before different parts of the pupil gave vision equal to that obtained through the central zone. In the most notable case, which was one of nuclear cataract, vision of 6/20 was obtained through the periphery and through the center with —1.00 sphere and —15.00 sphere respectively.

Jackson[5] has pointed out that it is not rare to find six to eight diopters of negative aberration owing to changes in the nucleus, and that these patients may obtain their best vision through the periphery of the dilated pupil. The other eye in the case cited above presented incipient nuclear changes, and in this eye the refraction was uniform throughout the dilated pupil. This absence of aberration may have represented a stage of transition from positive to negative aberration.

Peripheral corneal scars may, by reason of staphylomatous yielding and traction, considerably modify the corneal curvature. Three such cases were encountered during this investigation. One typical eye showed a band of light having a pendulum movement with the fulcrum at the dark area of scar in the lower nasal quadrant. The central position of the pendulum was near the axis of the astigmatism, and when this was corrected with a +5.50 cylinder axis 60 degrees a side-to-side scissors movement developed, indicating a measurable visual zone. The subjective test verified the skiascopic findings within one-half diopter of the sphere and cylinder and within five degrees of the axis, and gave 6/15 vision.

Batten[22] has reported two similar cases in which these appearances were produced by staphyloma of the sclera, and he calls the condition "conical astigmatism." These cases usually present a scissors-like movement with the blades of light pointing in the direction of the cicatrix or staphyloma, and under these circumstances the refraction of the visual zone may be very accurately determined by applying the principles given by Jackson[4] for analyzing scissors movements.

In this study we have been concerned chiefly with the simpler and more apparent forms of variation, but there are many aberrations of higher order, some of which are visible in skiascopy as indefinite irregularities of form in the central and peripheral areas of light and shadow. These complicated aberrations are due, Gullstrand[18] points out, entirely to the heterogeneity of the lens medium.

In several cases I have observed a faint dark ring surrounding the visual zone, which, as it gives the impression of being the outline of the fetal nucleus, I have called the ring of discontinuity. Jackson[23] has also seen it. Butler[19] points out that this skiascopic appearance is produced by abrupt demarcation of cortex and nucleus at the fetal nucleus; and, although the ring suggests a slight lamellar cataract, biomicroscopy shows these lenses to be normal. In eyes showing negative aberration, this ring seems sharply to differentiate the peripheral circle of light and the central glow when beyond the point of reversal for the visual zone. The peripheral glow appears uniform in brightness and movement.

In some instances, faint striæ, similar in appearance to the cortical spicules of incipient cortical cataract, radiate outward. Most of these delicate appearances need more refined methods for their study and determination. In contradistinction to the subjective methods used by Young, Donders, Helmholtz, Tscherning, Volkmann, Ames and Proctor[24], and others, Gull-

strand[18] has devised a delicate skiascopic method called objective stigmatoscopy, with which he has demonstrated a considerable degree of positive aberration within the optical zone.

The grosser defects, so disturbing in skiascopy, may also interfere in ophthalmoscopy to the extent that upon their recognition may depend the accuracy of the diagnosis of changes of level, appearances of the disc, parallactic movement, and so on. Burnett[25] has reported a case in which appearances simulating optic neuritis were due to unsuspected irregular astigmatism of the nasal quadrant of the cornea. This irregularity was not detectable by examination with oblique illumination, and, although skiascopy showed marked "internal shadows," ophthalmometry of the different corneal zones was relied upon to determine the defect. Jackson[5] has cited a case in which three diopters of positive aberration, discovered and measured by skiascopy, gave the appearances of early detachment of the retina.

It has been stated that vision of 6/6 or better was obtained in the vast majority of the present series of cases at the cycloplegic examination. Some of the eyes manifesting a high degree of aberration had a visual acuity of 6/4. Evidently the large amount of unfocussed peripheral light is disregarded in the interests of clear vision. There were, however, eyes in which the visual zone was small and was encroached upon by the aberrant peripheral rays, or the aberration was low in degree but more uniform in its increase from center to periphery, and in these cases some difficulty, either with the acceptance of the full spherical correction or in discrimination, was encountered at the trial case. Jackson[2] has called attention to this fact and cautions against always attributing unsatisfactory results to lack of cooperation and discrimination on the part of the patient.

Theoretically one-eighth or one-fourth diopter more plus or less minus sphere than found by skiascopy should be accepted at the trial case, but practically this is not often the case. Analysis of the results in the older patients (young children are not so reliable) shows that the majority accepted the same correction as determined by skiascopy, the latter being rechecked after the subjective tests. It is logical to attribute this fact to the influence of positive aberration within the optical zone; and those cases which demanded a weaker plus or stronger minus sphere than that decisively indicated by the shadow test, or which accepted more plus at the postcycloplegic examination than under the cycloplegic, are convincing evidence that positive aberration is the important factor.

It is reasonable to believe that the accommodation is more likely to become active in subjective testing than in the objective examination in the dark room, but we were unable to demonstrate such activity. Mason[26], using an aperture centered and of a size to correspond with the normal undilated pupil, found that in ninety percent of his cases better vision was obtained or a stronger plus lens was accepted (0.12 to 0.50 D. more), and concludes that it is just as important to take account of the aberrations of the eye as to paralyze the accommodation.

In any event, and realizing that there may be "many a slip" between the anterior surface of the cornea and the cerebral cortex, skiascopy is the most accurate practical method of studying the total refractive errors of all the zones of the eye; and with these skiascopic findings we are enabled to treat errors of refraction more rationally and scientifically, as befits the ophthalmologist.

In summarizing, the following points are emphasized:

1. In the vast majority of eyes there is considerable variation of refraction between the visual and the extravisual zones of the pupil. This difference varies in different individuals, in the two eyes of the same individual, and in the quadrants of the same eye.

2. The variations are chiefly "symmetrical" positive aberration, "symmetrical" negative aberration, and mixed aberration (scissors movement).

3. The superior and nasal quadrants are the most highly refracting, the temporal quadrant is only slightly less so, and the inferior quadrant is the weakest of the four.

4. The asymmetrical aberration producing scissors movement is chiefly in the upper and lower quadrants, the superior quadrant being the more myopic.

5. The maximum difference between quadrants in an individual normal eye was eight diopters, and the highest degree of aberration was 7.50 diopters.

6. The type and degree of aberration are not dependent on the kind or amount of refractive error. Nor is the size of the pupil of any significance with respect to the incidence of the different forms of aberration.

7. While positive aberration is the most frequent finding, especially in adults, negative aberration and the marked asymmetry of mixed aberration, both of which present the most disturbing skiascopic appearances, are met with, on the whole, in more than forty percent of children; and we must remember that it is in children that we are most dependent on skiascopy. "Symmetrical" negative aberration was not found in any patient over nineteen years of age.

8. The lens is a most important factor in producing the aberrations of the eye. It is reasonable to suppose that the tendency to negative aberration and lower positive aberration in the juvenile eye, and to higher positive aberration in the adult eye, is indicative of the growth and changes in refractivity of cortex and nucleus of the lens.

9. The aberrations of the eye must be reckoned with in ophthalmoscopy, and objectively and subjectively in applied refraction.

10. Skiascopy is the most practical method of determining these defects, and should be used routinely to study the refraction of all the pupillary zones of the eye.

In conclusion, the present writer, as pupil, wishes to express to the master, Dr. Edward Jackson, who has done so much for skiascopy and for ophthalmology in general, profound appreciation and gratitude for inspiration and patient guidance in the pursuit of this investigation.

Burns building

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SUBJECTIVE SYMPTOMATOLOGY OF OCULAR DISORDERS

An address*

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The speaker discussed the diagnostic significance of certain symptoms as they are commonly described by the patient in telling his story to the physician.

I wish to thank very much the ophthalmic section of the Saint Louis Medical Society and the members of the National Society for the Prevention of Blindness for the honor bestowed upon me by allowing me to address you this evening.

My talk will have nothing to do with the prevention of blindness, but with some subjective symptoms, symptoms which cannot be seen or felt or heard by the doctor, but are just sensations of the patient, which he has to relate to his doctor.

In my country at least when the clinicians introduce a patient to the students they use a brief summary of his history, and usually the patient is not allowed to speak for himself. It would take too much time. It may bear on his disease. It is later in private practice that we learn to hear patiently what the patient has to say. We have to do it if only for politeness' sake. and in that way we learn a good many things without our textbooks. We must do it also because it is a need for the patient. It is a sort of confession, so we have to allow him to speak freely and as long as he wishes.

The patient's sensations are quite varied, and I should like to mention this evening only two complaints, headaches and vertigo, two very common complaints.

These may have different causes, which sometimes the general practitioner is not able to elucidate, and therefore he refers the patient to the eye doctor to see if he may be able to find the cause in the eyes.

We know that in some cases the eyes may be the cause of headache. These are cases of inflammation of the eye, ocular hypertension, increased intraocular tension, or eye strain.

Pain due to inflammation of the eye does not arise from every part of the eye but only from the anterior part of the eye, provided with branches of the fifth nerve; that is the conjuntiva, the cornea, the ciliary body. An affection of these parts may cause pain. The retina and the choroid have no sensory nerves, and their inflammations are not painful and are revealed to the patient only by blurred vision. An affection of the optic nerve is sometimes painful if the inflammation is not in the optic nerve itself, but in the sheath of the optic nerve, which being of connective tissue is provided with sensory nerves.

The conjunctiva is not very sensitive. The cornea is very much so, especially if we have to deal with superficial lesions, because the network of nerves in the cornea is mostly superficial and highly sensitive, and inflammation of the iris and of the ciliary body is sometimes accompanied by very severe pain.

You may think that my subject is pain in the eye, while what I have to speak about is headache. The pains that originate in the eye often radiate into the head, the ear, the maxilla, so that sometimes the patient does not complain at all of pain in the eye but only of pain in the head.

Increased intraocular tension may also cause pain and sometimes very severe pain. In acute glaucoma it is very much pronounced, and the pain experienced in a case of very acute

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glaucoma is sometimes among the most severe pains that man may endure.

In such cases the eye is highly inflamed and the diagnosis of the source of the headache is easy. But there are cases of simple and of chronic glaucoma in which we scarcely see anything in the eye. In the onset of such cases we have only temporary increased tension, and in the intervals the tension may be normal. During an attack the patient complains of headache and of blurred vision. If we examine the eye during such an attack we find symptoms of increased tension. We find the eye hard, the cornea dull, the anterior chamber shallow, and the pupil dilated.

Sometimes the visual trouble is very slight and it is only pain which attracts the attention of the patient. I have seen a good many such cases which had been treated for a long time by medical attendants or even by eye men for sick headache or migraine.

If the pain in the head is severe, then by reflex action it may even cause nausea and vomiting. I once was called to see an old lady and examined her with the ophthalmoscope because she was believed to be suffering from meningitis. I found this lady in a darkened room with an ice compress on her head; and she was vomiting and complaining of the most severe headache. She had such photophobia that she could not open her eyes. But I saw at once that she had acute glaucoma. The patient did not say a word about pain in the eyes, only pain in the head, and the vomiting she had was just due to reflex action of the fifth nerve.

In this case, of course, the accurate diagnosis was easy, but in cases of chronic glaucoma there is often nothing wrong outwardly and the doctor supposes the condition to be a sick headache, especially if the attacks occur after some emotion, because emotion may also cause sick headache. We can only diagnose such cases accurately when we see them during the attack, because between attacks the eyes may look absolutely normal and the tension may seem normal. Then we may prescribe for the patient a miotic to use when he gets headache. In the case of sick headache the miotic would have no effect. If it is a case of glaucoma the miotic will relieve it in ten to fifteen minutes.

The third cause of headache is eye strain. Eye strain may be due to fatigue of the ciliary muscle. The accommodation is used too long or in too high a degree. For instance, in a case of hypermetropia you have a cause of headache. The headache may be due to use of the eye muscles in a case of muscular imbalance, difficult convergence or hyperphoria. Such cases can easily be found by exact examination. Muscular imbalance is sometimes difficult to discover, especially in hyperphoria. A new method demonstrated in such cases by American oculists is the process of bandaging one of the eyes for forty-eight hours, after which a latent hyperphoria may become manifest.

That the headache is due to eye strain may easily be suspected from different indications. First of all, it is less frequently present in children. It is not likely to be present in the morning, and is less usually present on Sundays. It is to be assumed that headache from eye strain disappears when the eyes have rested, and it disappears when a faulty refraction or a muscular imbalance is corrected by proper glasses. There are, however, cases in which no defect of accommodation and no muscular imbalance exists, or if it exists and is corrected the headache still comes with the slightest use of the eyes. These are cases of what we term nervous asthenopia, because there is a nervous component.

When we strain our accommodation or our extrinsic muscles we have not the feeling of fatigue in the muscle as we have the feeling of fatigue in our legs when we walk too long; we just have headache. Every one of you may make a simple experiment. If, for instance, you approach a lead pencil to your eyes and converge more and more, and if you maintain the effort

for a short while you will have no consciousness of fatigue in your ciliary muscle but you will have headache. So in some cases eye strain produces headache even though the eyes are emmetropic, or if any existing defect has been properly corrected. Such a nervous asthenopia is to be recognized by the fact that the headache comes much sooner than in ordinary cases, sometimes even after reading just a few minutes, and the headache does not leave the patient very soon after reading is stopped. It may persist to the next day. Then other people have the feeling of being dazzled by a bright light, not so much by sunlight but a white light such as comes from a white sheet of paper or a white tablecloth.

These cases particularly occur after some overstraining of the eyes, for instance, young men after passing an examination, maybe a seamstress who because of rush work had been working night after night, or especially if for some other reason there is general weakness, as in the case of a woman who reads much while still weak in bed after delivery. When once neurasthenic asthenopia is acquired, it may last for months or years and make the patient absolutely unable to work. It is quite a serious affair. Very often it is the only symptom of neurasthenia.

These cases may be cured by some sort of suggestion, and in fact if you prescribe very weak glasses for these people they will often feel very much relieved. It may be that after a few weeks they will come back and say the glasses are no good. Then we have to increase the glasses possibly a quarter of a diopter, or diminish them, and each time they feel better but each time the complaints recur.

If muscular imbalance is found an operation may be indicated. Dr. Stevens of your country did this to a very great extent. I know of a doctor in San Francisco for whom he did sixteen operations on the eye muscles. These were not completely divided, but just a few of the muscular fibers. Every time following this procedure the doctor was relieved for a while, then came back and had another operation on the muscle.

But an especially desirable method of treatment of these cases is suggestion to prove to the patient that he is able to read, write, and do near work as easily as a normal man. I thus assume that the pains the patient has once experienced come back because he is expecting them to return. It is a sort of expectation neurosis. The patient once had headache because of strain in his eyes, and now whenever he does not have it he is always waiting for his headache and so of course it is bound to come. So we have to show him that he is able to read and write.

If the patient says that he can read only for a quarter of an hour but not longer, let him sit down in your waiting room and read twenty minutes, next day twenty-five, and so on, and after each reading you apply the galvanic current, saying that it is to strengthen his nerves. If you only tell him he can read, he will not believe you. You must of course not let him know that this treatment has anything to do with suggestion. By this method I have scarcely had any cases which were not successful, and most cases have been cured permanently.

Another subject of my talk is vertigo, which may be due to different causes. It may originate in the brain, the stomach, the ears or in the eyes. For the diagnosis of vertigo we have to rely on the description the patient gives us of his sensations. As a matter of fact, very different things are described by the patient as vertigo; For instance, floating opacities of the vitreous body, prodromal attacks of chronic glaucoma, blurred vision from hypermetropia, or scintillating scotoma preceding an attack of sick headache.

There are even sensations of vertigo which are purely psychical phenomena. For instance, if one looks down into an abyss or looks down from a high tower one may experience a vertigo which is not a real vertigo but only a sort of fear or apprehension that one might drop down. I felt it myself in

my younger years when I did my first mountain climbing. After a little practice it disappeared and I did not have any more of this sensation. We may see people working on a roof or on a skyscraper in the most exposed situations, yet they never feel anything like vertigo simply because they are accustomed to that sort of thing. This kind of vertigo is simply a psychical phenomenon.

Vertigo depending on the eyes has always the same basis. We see the object at the wrong place. Our eyes may be all right, but if, for instance, you put a prism before one eye so as to deflect the rays, then the image of the object seen with this eye is at a place on the retina not corresponding to its place on the retina of the other eye. Then we see double; we have two images. One of these images corresponds to the object and the other is seen as if in a place where there is no such object.

Spectacles may be considered as composed of prisms. If we look through the glass at the center then we see the object in the right place, but, if we look obliquely, through the periphery, then, thanks to the prismatic action, we see the object at the wrong place. We experience this especially for instance if we go down a stairway. If you prescribe glasses for a patient and he is wearing them for the first time in his life, he may tell you the next day that the floor before him was elevated or that he saw the floor depressed and he was uncertain when going downstairs. Of course, one very soon gets accustomed to this peculiarity, but if the spectacles are very strong, as for instance the highly convex lens which one is obliged to wear after an operation for cataract, there are some patients who have to take such spectacles off when they want to go down the stairway. I have known people operated on for cataract who could not get accustomed to using spectacles at all.

Another basis for seeing an object at the wrong place is that without our knowing it one eye deviates from its natural position of correspondence with the other eye. You may make a simple experiment. If you look at an electric lamp and push one eye a little bit aside with your finger you will at once see two lamps, because with one eye you see it in its right place and with the displaced eye you see it at a wrong place. In this case you know whether the eye is displaced or not.

The eye may be displaced without the patient's knowledge for two different causes, either paralysis or spasm of one of the eye muscles. In the first case the eye is not moved sufficiently in the direction in which the other eye is moving, and in the second case it moves too much in that direction. In each case the patient is not aware of the faulty position of the eye.

In these cases in which the cause is paralysis or eye spasm, and the position of the eye no longer corresponds with the other eye regarding its position, with the good eye we see the object in its proper place and with the affected eye we see it at another place, and so we see double, and we have diplopia. But it is not the diplopia alone which causes vertigo, as is generally believed. A man who has a recent paralysis of the right external rectus muscle sees double and has a good deal of vertigo; the vertigo being present even if you prevent diplopia by covering the good eye. If a man who has only one eye gets a paralysis in this eye, he does not see double but he has vertigo.

The vertigo is not due to diplopia but to his seeing the object at the wrong place. For instance, if I had paralysis of my right external rectus muscle, I should see an electric lamp too much to the right. Observing that it is too much to the right, I try to turn my eye to the right. Then the object moves more to the right, and the more I try to see it the more the lamp goes to the right, and the more rapidly. My eye always remains at the same place. I intend to look to the right, but the eye does not follow because the nerve has been interrupted at some point. It is therefore this apparent movement of the object which causes vertigo.

I was once called to a patient who, like the patient with glaucoma of whom

I spoke, I found in a darkened room with an ice compress on his head; it was thought that he had a stroke of apoplexy. He had dropped down quite suddenly in the middle of the street, and when he was helped up by some people he complained of a tremendous vertigo and he vomited. It was easy to see that he had a muscular paralysis. When I told him to close the paralyzed eye he was all right.

In the second place, we have to do with spasm of the eye muscles. For instance, in ordinary convergent strabismus or squint, there is too much convergence. One sees the object in the wrong place, and of course there is diplopia. These patients, however, do not as a rule complain of vertigo, ordinary strabismus developing in childhood. But you can sometimes elicit a history of diplopia at the beginning of the squint.

Then we have vertigo because of spasmodic contractions of the eye muscles, which is a not uncommon affection after epidemic encephalitis. We also have an intermittent spasm in the cases of nystagmus in which the eye makes rapid oscillations from one side to the other and we see the objects moving. When I move my eyes to the left the images on the retina move to the right, but I do not see the object move. I feel the movement of my own eye and I expect the image to move to the other side. If I did not feel the moving of my eye, then I should see the objects going to the opposite side just as in the case of paralysis where I intend to move my eye but the eye does not respond.

We have different sorts of nystagmus, the commonest being in the case of congenital amblyopia from some defect in the retina or in the optic nerve, or a nystagmus acquired in early childhood because of an opacity in the cornea or the lens. In these cases we have no vertigo, no apparent movement of the objects, because the children have grown up with the nystagmus and they get accustomed to it and make allowance for it. But we have the apparent movement of the objects and also the resulting vertigo in all cases of nystagmus acquired later. The simplest way to produce such a nystagmus is to put a man on a rotating stool. After a very short while he will feel sick. You stop the stool and see the nystagmus of the patient's eyes provoked by the movement. He may be sick and he may even vomit if you have experimented too long; he stumbles, sees all objects moving, and has a vertigo.

In cases of nystagmus in multiple sclerosis you have the same vertigo and the same movement of the eyes. You have the same effect in a very pronounced degree in the nystagmus known as miner's nystagmus, which is due to working for years in coal mines. The nystagmus gradually gets worse and worse. Then the miner finds it difficult to get out of the mine, and he becomes dizzy or giddy. He sees the apparent movements and develops vertigo. But in all such cases vertigo comes from the same cause, that is, seeing external objects in the wrong position and sometimes seeing apparent movements of the object.

Skodagasse 13

METHODS FOR INCREASING THE DIAGNOSTIC SENSITIVITY OF PERIMETRY AND SCOTOMETRY WITH THE FORM FIELD STIMULUS

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Increase of sensitivity in testing for incipient scotoma may be obtained by lowering one or more of the three most important factors in the visibility of an object, namely its size, its difference from the background, and the intensity of the illumination. There should be an increase in the number of field studies along these lines. Information is appended as to the use of standard materials for such studies.

The program which we have been following for some years in an attempt to improve the clinical usefulness of perimetry comprises in general the following features. (1) A study of the characteristics and peculiarities of the visual response from the center to the periphery of the retina. (2) A study of the factors which cause variability of result in the testing of these responses in a given eye. (3) The devising of methods and apparatus for the control of these factors. (4) A study of the factors which cause a variability of result from eye to eye. Statistical procedure has been used here, but the data have been collected by experimental methods. (5) The application of field study to the diagnosis of disease. This, according to our plan, involves the construction of diagnostic scales showing the probable range of variation of results for nonpathological eyes, and so far as possible for the more important pathological conditions. (6) A study of the distribution of sensitivity to light and color over the retina in several meridional quadrants. This supplies the information needed to understand and interpret the results obtained in perimetry and scotometry. (7) A scientific study of eye diseases in relation to test results. The intention here is to create a definite, understandable and teachable literature on the effects of the various pathological conditions on test results. (8) The devising of methods for increasing the diagnostic sensitivity of perimetry and scotometry.

It is our purpose in the present paper to discuss the last of these items, namely, methods and devices for giving perimetry and scotometry greater facility or sensitivity for diagnosing pathological conditions. In the development of perimetry the study of the color fields was added in part for this purpose; that is, the size and shape of the color fields are more affected than the size and shape of the form field by the influence of factors affecting the sensitivity or response of the retina. The use of the color fields for clinical purposes, however, presents greater difficulties than the use of the form field.

(a) Among nonpathological subjects there are greater individual differences in the size and shape of the color fields than in the size and shape of the form field. That is, there is a tendency towards a wider scatter in the results obtained and therefore a greater tendency for an overlap between nonpathological and pathological cases. (b) The technique needed to give a satisfactory reproducibility of result in the color fields for a given eye is more difficult and complicated. (c) The judgment of the colored stimulus, more particularly in case of unintelligent and untrained observers, presents greater difficulty than the judgment of the stimulus for the form field. And (d) a considerable percentage of the population suffers from congenital defects in color vision, varying both in range and amount.

For these reasons, then, there is pressing need for increasing diagnostic

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sensitivity in the use of the form fields. There are, it may be noted, very hopeful prospects of being able also materially to increase the diagnostic sensitivity of the color fields. The discussion of devices for increasing diagnostic sensitivity will be confined in this paper, however, to the form field. Methods of adding sensitivity to the use of the color fields will be taken up in later papers.

The means for adding sensitivity to that division of field study known as scotometry are comparatively obvious. In order to pick up faint or incipient scotomata it is necessary only to decrease by sufficient amount the visibility of the stimulus. The amount of increase in sensitivity that can be secured in this way is clearly limited only by the threshold of visibility. The three most important factors in the visibility of an object are its size, its difference from the background, and the intensity of the illumination. The influence of the first two of these needs no comment. The influence of the third probably merits a word of explanation.

The visual or sensation difference for a given difference in reflecting power between an object and its background increases rapidly with increase in the intensity of the illumination received. Objects become more easily distinguished from their background, therefore, as the intensity of the illumination is increased. The increase is greater in case of white objects on black, or light objects on dark backgrounds, than in case of black objects on white or dark objects on light backgrounds. Also the amount of increase varies with the state of adaptation of the eye.

The decrease in visibility of the test object which is needed to secure greater sensitivity in scotometry may be produced, therefore, by decreasing the size of the object, by decreasing the difference in coefficient of reflection between object and background, by decreasing the intensity of illumination, and by combination of any two or all three of these procedures. In case only one of them is employed, the decrease in the difference in coefficient of reflection offers perhaps the greatest possibilities; that is in the use of very small objects the influence of the acuity factor, especially in the more remote portions of the field, is present perhaps to a degree that is detrimental to the purpose of the test, and the use of low illuminations always entails a certain amount of difficulty and inconvenience for clinic purposes. The use of a white test object of medium size, for example 0.5 degree, on a suitably selected light gray, or the use of a dark gray test object of similar size on a black background is, however, certainly to be recommended in the search for incipient Bjerrum scotomata, Seidel's sign, and other faint scotomata which may be present in the field of the pathological eye.

The field over which a test object of a given visibility can be used without exceeding the limits of sensitivity to that test object can be determined by first mapping roughly the field for that stimulus. Data on this point of general applicability to normal eyes will be given in later papers. Some discretion has, of course, to be exercised in the employment of stimuli of low visibility, lest the small normal depressions of sensitivity which may occur in the field so mapped are not mistaken for very faint scotomata. In the parts of the retina in which scotomata are the most frequent, however, the danger in this respect is probably not prohibitively great.

It is just as obvious perhaps that the methods outlined above for giving increased sensitivity for detecting scotomata should facilitate also the detection of regional cuts or very pronounced irregularities in the contraction of the form field in their earlier or incipient stages. Rønne's nasal step in case of glaucoma should be picked up with much greater ease with a stimulus of low visibility than, for example, with a one-degree white stimulus on black under seven or more foot-candles of illumination. The same should be true also of sector-shaped cuts and other pronounced indentations in the field.

Small stimuli have been used for some time with success for the detec-

tion of these more pronounced irregularities in the shape of the field. The use of the other methods of decreasing visibility should, we believe, be encouraged also. In this connection it is gratifying to note that in nonpathological eyes the changes in shape accompanying the contraction of the field caused by the use of these methods of reducing the visibility of the stimulus are never pronounced. Thus in their use the chances of confusing the normal with the pathological are practically negligible.

It is not so obvious perhaps that the use of test objects of low visibility will lead to greater facility in the diagnosis of pathological cases based on size of field. Any sufficient decrease in the visibility of the stimulus must necessarily lead to a contraction of both the pathological and the nonpathological field. Since it gives greater sensitivity for picking up individual differences, it will probably also lead to a greater scatter in the results for both pathological and nonpathological cases. This would incline one to expect, therefore, a greater tendency towards an overlap between the results for the pathological and nonpathological cases, if it were not for the fact that we have in general found that any condition which causes a contraction of the field for nonpathological cases causes a greater contraction for pathological cases. The tendency of this effect would be towards a wider separation between the two classes of results and the prevention of overlapping. Just what will happen in this regard cannot be determined until a comparative study is made of a large number of both kinds of cases, using the methods of sensitization in question. Such studies are in progress and results will be reported in later papers. In the meantime the above suggestions may be of service to other workers.[1]

Wilmer Ophthalmological Institute

[1] It is obvious that, to carry on field study with satisfactory facility and versatility, each office and clinic should have a supply of the more frequently needed materials. Among these may be mentioned gray, white, black and colored papers; a series of punches for the different sizes of stimulus wanted; and flat gray, white, and black paint. The gray papers and gray paints which are to be used as backgrounds or preexposures for colors should of course be of the brightness of the color. The gray, white, and black papers of the Hering series can be obtained from the C. H. Stoelting Company, 424 North Homan Street, Chicago; the colored papers of the Heidelberg series from the Bausch and Lomb Optical Company; flat gray paints to match any sample submitted, flat white paint of eighty-five percent coefficient of reflection, and flat black paint from the Munsell Research Laboratory, 10 East Franklin Street, Baltimore, Maryland. It should be possible to have the punches made to specification by almost any manufacturer of scientific instruments. In many cases they can be procured from local machine shops.

TWO NEUROFIBROMAS IN ONE EYE

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A case of two neurofibromas in one eye is reported, one arising in the iris and ciliary body, the other in the sclera posteriorly at about the entrance of the ciliary vessels and nerves. The patient did not show the physical signs of Recklinghausen's disease. The case is from the practice of Dr. C. A. Thigpen; the report from the Army Medical Museum collection of ophthalmic pathology, maintained with the cooperation of the American Academy of Ophthalmology and Otolaryngology, the American Ophthalmological Society, and the Section on Ophthalmology of the American Medical Association.

The fibrous tumors arising about nerves, occurring singly or in multiple in Recklinghausen's neurofibromatosis, have been termed neurofibromas[1]. These tumors are cited in the literature under the various titles of leucosarcoma, neurofibroma, neurofibromatosis, neurinoma, sympathicoblastoma, fibroma, and fibrosarcoma. This varied terminology makes it unlikely that the cases of neurofibroma cited here represent the frequency of neurofibroma of the eye, but the condition is relatively rare and no case of multiple tumors in this organ was found in the literature.

In several cases cited below neurofibromatosis was present. In this disease there are often tumors of the skin of the lids as well as in other parts of the integument, while tumors of the viscera are sometimes observed.

Single neurofibromas are found in persons not afflicted with generalized neurofibromatosis, and there is a probability that some tumors considered to be simple fibromas are neurofibromas[1].

The following cases were found in a search of the literature: Gillette[2] reported two cases of tumor of the eye and orbit, both of which were so large that the origin could not be determined. The description of the cellular picture suggests that these were neurofibromas. Mason[3] reported a case of fibrous tumor at the sclerocorneal junction. The description of this case is not sufficiently clear to render diagnosis possible. Crawford[4] reported a fibroma of the eye at the sclerocorneal junction; No histological description was given. Meyer[5] describes a leucosarcoma of the cornea and sclera which was probably a neurofibroma. Kyrieleis[6] describes one case under the title neurinoma, and shows a photomicrograph. He discusses neurofibromas, giving a résumé of the work of Axenfeld on the ciliary nerves. The latter also reports one case[7]. The last two authors cited are the only ones whose cases were definitely neurofibromas, and the ciliary nerves were the probable points of origin of the tumors in their cases. Both were single tumors.

Case history

Army Medical Museum accession no. 30183, female, white, aged thirty-five years, married. Both parents are living and healthy. The patient has always been in good health, never having contracted the diseases of childhood. She is a strong, robust person, and has no evidence of other tumors.

In 1912, seventeen years prior to the enucleation of the eye, she noticed in the iris of the left eye a small yellow spot which gave her no inconvenience. She consulted an ophthalmologist who assured her it was not serious, and fitted her with glasses. She noticed, however, that within the following year the spot gradually grew larger, and she consulted the ophthalmologist again, with the same result. Her vision at that time, according to her story, was perfect. For the next four years the eye remained in about the same condition, when suddenly she began to

Fig. 1 (Callender and Thigpen). Section through both neurofibromas.

have headaches and she did not think her vision was as good as formerly. She again consulted the same ophthalmologist, who gave her the assurance that the condition would never prove to be serious, and changed her glasses. From that time on, she suffered occasionally from headache and the growth seemed to be getting larger.

She consulted one of us (Thigpen) in October, 1928, for the first time. Upon examination, a tumor of the iris was found involving the ciliary body and extending backward into the vitreous chamber. The pupil was slightly enlarged and irregular. The biomicroscope showed that the growth was not very vascular. The tension was above normal. Ophthalmoscopic examination showed a hazy vitreous which prevented a clear view of the optic disc. The vision was 20/200.

The patient was told that the eye was in a serious condition and should be removed at once. She was referred back to the ophthalmologist who had had her under observation since 1912. Upon examination, he still advised against any operation, assuring her that the eye was not in a serious condition. Shortly afterward, she had a glaucomatous attack with much suffering, and on January 31, 1929, she applied again for the removal of the eyeball. This was done immediately.

Since operation there has been complete relief from pain, and examination of the patient seven months after operation showed the orbit to be free from recurrence.

Description of specimen

The eye is partially collapsed and presents a white firm tumor of the ciliary body extending into the anterior chamber, the length in this direction

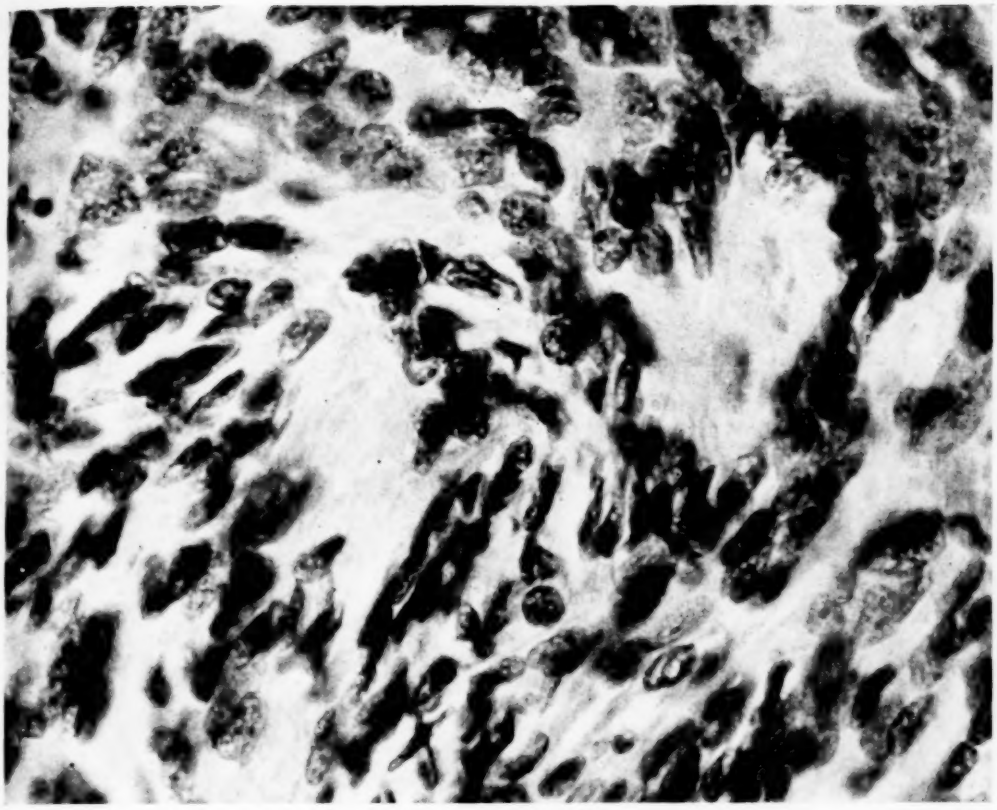

Fig. 2 (Callender and Thigpen). Characteristic palisade arrangement of nuclei about fibrous centers. × 700.

being 8 mm. It is approximately 4 mm. broad and 2.5 mm. thick. On the other side of the eye is a tumor of similar appearance, roughly globular, about 14 mm. in diameter, which projects outside of the globe approximately 7 mm. and into the vitreous chamber approximately the same distance. (Figure 1.)

Microscopical examination: The anterior mass practically replaces all but the posterior portion of the ciliary body, and extends along the posterior surface of the cornea and the anterior surface of the iris practically to the periphery of the latter. The posterior tumor appears to arise at about the entrance of the ciliary vessels and nerves and is behind the choroid. The sclera is markedly thinned over the tumor projection, but its fibers are still present over the latter. In none of the sections was it possible to demonstrate a direct connection between the ciliary nerves in either tumor, and no nerve fibers were found in the tumor, though it must be noted that the use of differential stains was not possible. The retina is displaced by the posterior tumor from the disc to the ora serrata, serous exudate being behind the retina anteriorly. Histologically the tumors are made up of spindle-shaped cells often arranged in whorls, occasionally having a palisade arrangement around a hyalin or fibrillar matrix. (Figure 2.) The ciliary tumor is somewhat more vascular and more cellular than the posterior one.

Discussion

Axenfeld[7] described the course of the ciliary nerves which he found to pass through the sclera from the choroid in the anterior portion of the globe. He also found loops formed in the sclera,

and he appears to consider that such loops may be a point of origin for these neurofibromas.

Although the ciliary nerves pursue a rather direct course from entrance to termination, and though it is possible that these two tumors arose along the same nerve fiber, the location of the tumors indicates that this probably was not the case.

In the present state of our knowledge, and in view of the fact that tissue having the chemical reactions of fibrous connective tissue with its collagenous matrix forms the bulk of these tumors, and also that neurofibroma has precedence in the indexes of medical literature, it seems best to retain this term for these tumors.

Seventh and B streets S.W.

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RECURRENT HEMORRHAGES INTO RETINA AND VITREOUS: CALCIUM DEFICIENCY AS POSSIBLE CAUSE

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Recurrent hemorrhages into the vitreous may result from one or more of a number of causes here discussed. Calcium deficiency should be kept in mind as a possible cause, as illustrated by one or more of the cases here reported. One patient was apparently much improved under calcium therapy. Read before the Academy of Ophthalmology and Otolaryngology, October 21 to 25, 1929.

Since the publication of Finnoff's excellent paper on this subject, I have been able to find sixty-nine additional cases, not including the three cases here recorded.

Recurrent hemorrhages into the retina and vitreous were first described by Graefe in 1855. In 1880 Eales published his paper, giving a very comprehensive description of this disease which often bears his name.

In recent years the following conditions have been given as causes of recurrent hemorrhages into the retina and vitreous.

Zentmayer believes that the cause may be found in the adrenals, whether acting independently or in conjunction with tuberculosis.

Lewis is of the opinion that lysis of the intracellular cement substance and of the cell wall itself is due to a soluble protein poison usually given off from a focal infection and resulting in retinal hemorrhages. He reports two cases with abscessed teeth, both showing the presence of streptococcus hemolyticus.

Ellett, Redding, Radcliffe and Young, Finnoff, and Godwin report cases in which focal infections are given as the cause.

MacGillivray's patient had lowered coagulation time, coagulation taking place in seventy-five seconds.

Jeandelize's three patients all showed hyperthyroidism, a degree of renal insufficiency, and arterial hypertension.

Safar, Koby, Meissner, Braun, Hanke, Finnoff, and Davis report cases which they attribute to tuberculosis.

Joynt reports one case which he considers the result of syphilis.

Valude's case showed a definite reduction in renal permeability, eliminating only 35 parts of phenolsulphonaphthalein instead of 63 parts in 70 minutes.

Canwright's interesting paper concerns his personal experience as a sufferer from Eales's disease and considers constipation and improper diet as the cause, although he also had several foci of infection.

Meanor's patient, a married woman thirty-three years of age, had intraocular hemorrhages at every menstrual period since beginning to menstruate, the hemorrhages clearing before the next menstrual period.

McCraw and Strader each report one case in which the cause was undetermined.

McCrea reports fifteen cases of retinal petechiasis, not included in this paper as cases of Eales's disease, due to an exudation of blood without rupture of the vessel wall, all of these cases being the result of focal infections; ten of the cases showed rapid and marked improvement in vision following elimination of the focal infection. McCrea, furthermore, believes that the petechiasis occurring in the bladder is the result of focal infection and both are an expression of the same disease.

Prognosis

The hemorrhages themselves clear up fairly rapidly, particularly the early hemorrhages. In Lauber's patient, a child eleven years of age, the vitreous of the left eye after an injury was so congested with blood that perception of light was reduced to a minimum; but after a fortnight the vitreous was again so transparent that vision was normal.

Meller, speaking of the absorption of hemorrhages from the vitreous, states: "The most favorable conditions obtain in otherwise healthy eyes, in which the hemorrhages are due to a trauma which affects only a circumscribed spot, without involving the other tissue of the eye, or where a spontaneous bleeding into the vitreous occurred in circumscribed phlebitis."

After repeated hemorrhages the vision is usually lost from proliferating retinitis and detachment of the retina, and unless further hemorrhages can be prevented most of these cases will end in blindness.

Treatment

Gonzalez recommends autohemotherapy, injecting 5 c.c. of the patient's blood in the gluteal region three times a week; later, twice a week.

Grünert obtained considerable improvement in two out of four cases by paracentesis performed eight to sixteen times. After each second or third paracentesis he used subconjunctival injection of asterol, dionin, and sodium chloride. This procedure is recommended for use in old cases only.

Lewis advises removal of foci of infection and the use of antigen-vaccine, which in his two cases presumably prevented further hemorrhages.

Joynt obtained satisfactory results with antiluetic treatment in a patient who had a three plus Wassermann.

Zentmayer believes thyroid extract to be of real value in these cases.

Redding, Radcliffe and Young, Godwin, and Ellett all report cases in which foci of infection were found and removed, all of the foci being in the teeth, tonsils, or sinuses.

Koby used arsenic, potassium iodide, old tuberculin, subconjunctival injections of two per cent to four per cent sodium chloride, and Westermann's aminothionin pomade.

Jeandelize believes that no antihemorrhagic treatment should be neglected, and that the logical treatment as suggested by his findings might consist in periodic administration of hematithyroidin and pituitary extract.

Canwright advises proper diet, relief of constipation, and removal of foci of infection.

Finnoff used tuberculin in one of his cases. Davis used tuberculin in two of his cases, losing both eyes in one case and obtaining vision of 20/200 in one eye in the other case. Hanke reports good results with old tuberculin, starting with 0.001 mg., and increasing 0.001 mg. every second day in conjunction with subconjunctival injections of sodium chloride solution.

Spanyol reports excellent results by puncture and aspiration of 0.5 c.c. of vitreous, but does not recommend replacement of vitreous by sodium chloride as advocated by Elschnig. Aspiration is indicated only in cases where there has been no fresh hemorrhage for some time. Braun, on the other hand, reports good results from aspiration followed by replacement, supplemented by autohemotherapy and irradiation of the spleen.

Zur Nedden believes aspiration and replacement contraindicated in Eales's disease.

Benedict advocates the use of salvarsan for its nonspecific action. He also states that patients with tuberculous lesions about the eyes often respond much better to salvarsan than to tuberculin even in the absence of syphilis.

Case reports

Case no. 1. Mr. R. G. C., white, aged thirty-nine years, first seen February, 1924, complaining of loss of vision in left eye.

Family history: No history of tuberculosis, gout, hemophilia, or eye trouble.

Past history: Never suffered from constipation, syphilis, or hemophilia. Had nose bleed just before first intraocular hemorrhage, and had nose bleed as a boy, had had no nose bleed since first intraocular hemorrhage in 1908.

Eye history: Shown graphically in table no. 1.

Eye examination: February, 1924, V. O. D. fingers at one foot, O. S.= 6/45. External examination, pupillary reactions, and tension normal in each

TABLE NO. 1. EYE HISTORY OF CASE NO. 1

Date	Attack		Seen by	Duration	General examination	Treatment
	O. D.	O. S.				
May, 1908	1st		Kincaid (Knoxville)	3 weeks	Negative	KI and dionin
June, 1908	2nd	1st	Driver (Norfolk)		Suspected lues	KI and mercury
July, 1908			Savage (Nashville)		Negative	KI
1909			Wescott (Chicago)		Negative	No treatment advised
Autumn, 1917		2nd	Washburn (Jacksonville)	6 weeks	2 or 3 abscessed teeth found. Recent loss of 15 lbs. in weight.	Teeth removed, KI and dionin, subconjunctival injections of Hg cyanide.
Autumn, 1918		3rd	Taylor (Jacksonville)	6 weeks	Infected tonsils	Tonsils removed.
Aug., 1919		4th	Taylor (Jacksonville)	6 to 8 weeks	Negative	KI and dionin.
Nov., 1920		5th	Gill (Roanoke)	6 to 8 weeks	Ethmoids	Exenteration of ethmoids.
Feb., 1924		6th	Young (Roanoke)	3 to 4 weeks	Negative	KI, dionin, and rest
Mar., 1924		7th	Graham (Wytheville)			
Dec., 1924		8th	Graham (Wytheville)	3 to 4 weeks	Negative	Arsenic, mercury, and gold.
Jan., 1925		9th	Graham (Wytheville)	3 to 4 weeks		
Jan., 1926		10th	Shiras (Cleveland)	3 to 4 weeks	Positive tuberculin. Three abscessed teeth	3 teeth extracted, O. T. 10 doses, KI, and dionin, Hg cyanide injections.
Autumn, 1926		11th	Shiras (Cleveland)	3 to 4 weeks	Negative	Same as above except no teeth extracted.
Mar., 1927		12th	Shiras (Cleveland)	3 to 4 weeks	Negative	KI and dionin, old tuberculin.
Aug., 1927		13th	Young (Roanoke)	6 weeks	Lowered blood calcium	Thyro-calx, parathyroid, and glucalcium

eye. Fundi: O. D., considerable proliferating retinitis and vitreous opacities. O. S., slight amount of proliferating retinitis and fairly dense vitreous opacities.

Patient not seen again until August 12, 1927, at which time vision in O. D. unchanged but vision O. S. 6/12. Fundus picture much the same as in 1924, except vitreous almost clear in O. S.

The blood calcium was found to be extremely low, only 6.5 mg. per 100 c.c. of blood. Dr. C. D. Nofsinger of the Lewis-Gale hospital advised the following therapy for a period of three weeks every three months: Gluco-cal-

TABLE NO. 2. RÉSUMÉ OF FINNOFF'S COLLECTED AND REPORTED CASES

Cause	No. of cases	Sex			Range of age at 1st hemorrhage	Eye first affected			
		M	F	Not specified		O. D.	O. S.	O. U.	Not specified
Undetermined	51	44	7		16 to 43	15	15	4	17
Tuberculosis	27	20	7		10 to 37	9	13	2	3
Probably tuberculosis	9	8	1		15 to 23	5	4		
Gastrointestinal, constipation, and gout	8	8	0		14 to 30	0	6		2
Syphilis	5	4	0	1	18 to 33	1	2		2
Focal infection	4	1	2	1	23 to 40	1	2		1
Disturbance of blood and circulation	4	1	1	2	26 to 28	1			
Menstrual disturbance	2		2		22 to 29	1		1	3
Total	110	86	20	4	10 to 43	33	42	7	28

cium (Lilly) 5 c.c. intravenously twice a week; parathyrin (Swan-Meyers) 1 c.c. intramuscularly twice a week; thyro-calx (Mulford) tablets (size no. 2), one tablet by mouth three times a day.

Dr. Charles Graham of Wytheville carried out the above therapy for a period of three weeks every three months.

Strange to say, the patient can tell by his symptoms of depression and malaise that his blood calcium is low. The calcium therapy almost immediately gives the patient a sense of vigor and well-being. Furthermore, he has had no attacks of hemorrhage since beginning the calcium therapy two years ago, as compared with eight hemorrhages in the three and a half years preceding calcium therapy.

Case no. 2. Mr. G. N., white, aged thirty-four years. First seen June 15, 1929, complaining of loss of vision in the left eye. Loss of vision occurred during March, 1929, this being the fourth attack. First attack, left eye, 1920; second attack, left eye, 1923; third attack in both eyes, 1928; fourth attack in left eye, 1929.

Family history: No hemophilia, eye trouble, gout or tuberculosis.

Past personal history: Appendix removed in acute attack in 1926; no constipation, tuberculosis, lues, or hemophilia. Suffered from epistaxis from 1918 to 1924, averaging about one hemorrhage every two weeks; has had no epistaxis since 1924. Sinuses, Wassermann, and general examination negative, except for two abscessed teeth, which were removed June, 1929. Blood count essentially negative. Blood calcium 9.5 mg. per 100 c.c. Coagulation time of blood from vein six minutes.

Examination: Vision without glasses: O. D. 6/4, O. S. fingers at eighteen inches. External examination, pupillary reactions, and tension negative. Fundus, O. D., shows several hemorrhages, largest of which extends along the inferior temporal vein for a distance of five disc diameters; the upper portion of the disc shows an area of proliferating tissue containing numerous small blood vessels; near the periphery below is a large atrophic area, probably the result of an old hemorrhage. O. S., very faint fundus reflex made out.

Treatment: Calcium therapy; glucocalcium (Lilly) 5 c.c. intravenously twice a week; parathyrin (Swan-

TABLE NO. 3. RÉSUMÉ OF YOUNG'S COLLECTED CASES AND OF THE THREE CASES HERE REPORTED

Cause	No. of cases	Sex			Range of age at 1st hemorrhage	Eye first affected			
		M	F	Not specified		O. D.	O. S.	O. U.	Not specified
Undetermined	17	4		13	17 to 40	1	2		14
Tuberculosis	39	5	1	33	18 to 35		3	1	35
Probably tuberculosis	1		1		21	1			
Gastrointestinal	1	1			32	1			
Syphilis	1	1			24		1		
Focal infection	6	5	1		21 to 70	3	1		2
Disturbance of blood and circulation	2	2			23 to 28	1	1		
Menstrual disturbance	1		1		33				1
Hyperthyroidism, renal insufficiency, arterial hypertension	3	3			20 to 25				3
Definite reduction in renal permeability	1	1	0		18		1		
Total	72	22	4	46	17 to 70	7	9	1	55

TABLE NO. 4. CONSOLIDATION OF FINNOFF'S AND YOUNG'S COLLECTED AND REPORTED CASES

Cause	No. of cases	Sex			Range of age at 1st hemorrhage	Eye first affected			
		M	F	Not specified		O. D.	O. S.	O. U.	Not specified
Undetermined	68	48	7	13	16 to 43	16	17	4	31
Tuberculosis	66	25	8	33	10 to 37	9	16	3	38
Probably tuberculosis	10	8	2		15 to 23	6	4		
Gastrointestinal, constipation, and gout	9	9			14 to 32	1	6		2
Syphilis	6	5		1	18 to 33	1	3		2
Focal infection	10	6	3	1	21 to 70	4	3		3
Disturbance of blood and circulation	6		1	2	22 to 29	2	1		3
Menstrual disturbance	3	3	3		26 to 33	1		1	1
Hyperthyroidism, renal insufficiency, arterial hypertension	3	3			20 to 25				3
Definite reduction in renal permeability	1	1			18		1		
Total	182	108	24	50	10 to 70	40	51	8	83

Meyers) 1 c.c. intramuscularly twice a week; thyro-calx (Mulford) tablets (size no. 2), one tablet by mouth three times a day; dionin two percent twice a day three weeks out of every month; thyroid one-half grain three times a day.

Case no. 3. Mr. H. W. R., white, age twenty-six years, a patient at Catawba sanatorium for tuberculosis, first seen February 22, 1929, for refraction. At this time he obtained vision of 6/4 in each eye with proper correction. Fundi at that time negative, except for some proliferating tissue over the right inferior temporal vein.

Next seen June 27, 1929, at which time there were about fifty hemorrhages into the retina of each eye, some flame-shaped but most of them clump-shaped. No vitreous opacities. Vision with glasses O. D. 6/6, O. S. 6/5.

Family history: No history of tuberculosis, hemophilia, gout or eye trouble.

Past history: No hemophilia or constipation. He is now a patient at the sanatorium on account of pulmonary tuberculosis. No injury of either eye. Had epistaxis for four years, averaging about ten hemorrhages per month, but has had no hemorrhages for the past twelve years.

Laboratory examination: Sputum positive for tubercle bacilli. Wassermann, feces, urinalysis, and blood examination negative. Blood calcium 11 mg. per 100 c.c. of blood.

Treatment: None except the usual sanatorium treatment for tuberculosis. Potassium iodide is contraindicated on account of his pulmonary lesions, and it would seem utterly useless to give old tuberculin to a patient who is already getting an overdose of tuberculin into his system from the active pulmonary lesions.

Of the three cases reported above I have considered deficiency of blood calcium as the cause in case no. 1. The cause was undetermined in case no. 2, although it might be considered the result of abscessed teeth, or again the result of lowered blood calcium, the patient having only 9.5 mg. of calcium in 100 c.c. of blood. Tuberculosis would seem to be the cause in case no. 3, as all other examinations were negative and the patient has a very definite pulmonary tuberculosis.

Conclusions

1. Recurrent hemorrhages into the retina and vitreous are evidently the result of one or more of many widely different pathological phenomena, and it may well be that two or more factors are necessary.
2. Calcium deficiency should be kept in mind as a possible cause.
3. In one case calcium therapy not only seemed to prevent further hemorrhages, but every much improved the patient's general condition.

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THE TOLERANCE OF THE CRYSTALLINE LENS TO METALLIC FOREIGN BODIES

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The shape, size and velocity of a foreign body, its chemical nature, and the direction of its transit determine the subsequent reactions of the eye. The formation of an opacity does not necessarily follow injury to the lens. Even when a foreign body is lodged in the lens itself, the resulting opacity may be, and may remain, unimportant. A conservative policy of treatment is recommended and is supported by the experience of four case histories related in detail.

Traumatic opacities of the crystalline lens can generally be subdivided into two categories: those in which an injury of the globe, especially a blunt one, does not give rise to its perforation, and those in which perforation takes place. The severe lesions due to these injuries are not confined to the ocular membranes, but more frequently come to involve the lens also. Rarer indeed, but well known, are those cases in which a solitary opacity of the lens follows a blunt, unpenetrating injury of the eyeball and the coincidence of tears of the sphincter with hemorrhages into the anterior chamber may often be observed. Such opacities usually progress slowly, until the cloudy lenticular masses at last begin to swell. Lenticular absorption, if it occurs at all, is very slight.

The form and site of such opacities vary greatly. The common anterior annular capsular cataract which is coincident with the pupillary margin may remain stationary or recede. Rarer are the posterior subcapsular cortical opacities which are star-like and exhibit fine radiations in the equatorial region. I have seen such an opacity, following an injury to the eye by a stone, clear up completely. The condition of the healed eye has remained unchanged these five years.

Case 1: H. H., twenty-five years of age, consulted me with the complaint that five days ago a stone had hurt his right eye, causing severe pain and the loss of visual acuity. The pain had afterwards slowly subsided and the visual acuity somewhat improved, but he still saw less with the right than with the left eye. The examination of the right eye revealed: vision about 5/50, pupil irregular. In the upper temporal portion of the iris the pupillary reaction was very sluggish. In the lower part of the anterior chamber there were remnants of hemorrhages, and above on the temporal side a pretty extensive iridodialysis. The posterior face of the lens showed extensive subcapsular, cortical, and typically star-like gray opacities. The fundus was normal. Tension 21 mm. (Schiøtz). The left eye was normal. During further observation the opacities cleared up more and more, and became after three months quite imperceptible. The vision was then 5/7. Having had the opportunity to examine the patient once more on October 5, 1927, I saw that the condition was identical with that at the time of his discharge. Avizonis describes a similar case in which the dense star-like opacities of the posterior cortex receded spontaneously after one month and the vision improved from 0.6 to 0.8.

Rifts of the zonula and also of the anterior capsule are assumed to be the direct causative factors of such star-like opacities of the posterior cortex. The subcapsular seat of these star-like opacities due to contusion, besides the definite location and peculiarity of the form and the tendency to regress, suggest the instantaneous traumatic detachment of the posterior lenticular capsule as the direct traumatic cause, and the abnormal conditions of diffusion, though only of short duration, may lead to opacity of the involved lenticular area.

The regression of such star-like opacities of the lens, due to traumatism, may occasionally also be met with, when a foreign body, transfixing the eyeball

and injuring the lens directly, pierces the latter and comes to stop in the posterior portion of the globe, or lodges in the lens itself. The first eventuality is more frequent. If the injury is not too severe nor causes displacement of the lens, the opacities may remain stationary or even clear up in very rare cases. Standstill or absorption is more probable when the foreign body is small, has sharp edges, and enters the globe edge first; furthermore when the foreign body traverses the crystalline lens quickly and thereby produces a small wound, or when fibrin rapidly collects about the capsular wound, or the iris covers the wound and the latter closes rapidly by the proliferation of the capsular epithelium. In elderly people in whom the induration of the lens has already reached an advanced stage, the condition for the opacities remaining stationary are more favorable than in young people, and the opacity may often be limited to the vicinity of the injured point. There are even cases on record in which the anterior and posterior capsules of the lens were torn and yet the opacity localized only about the track of the foreign body.

Much rarer are those cases in which the foreign body passing through the eyeball, lodges in the lens. The further fate, not only of the lens, but also of the whole eye, depends on the size, form and keenness and particularly on the matter of the foreign body. Foreign bodies of iron may induce siderosis of the eyeglobe, whereas those of copper and brass provoke only a chemical irritation which may entail an aseptic discharge. Aluminum, lead and similar metals are better tolerated, yet they also may induce opacification of the vitreous body, formation of dense, tough membranes, and retinal lesions. Cases in which the foreign body retained in the lens induces lesions which remain confined to it alone, are rare and are still the object of literary discussions. For the most part in these cases the splinter harbored in the lens induces its complete, progressive opacification sooner or later after the injury. Lampert describes a case in which the removal of the iron splinter from the lens by a magnet was followed by the absorption of the whole lens. In another case there appeared only parallel, fine, linear opacities running from the capsular lesion to the foreign body. Monsilla saw, about one year and a half following the injury, the dun foreign body in the lens; the iron splinter 0.5 mm. in length was removed by magnet, whereupon total opacification of the crystalline developed in a short time. Of about the same size was the splinter which Bell removed. Four months afterwards, at the place where the foreign body had been imbedded, a delicate circumscribed opacity was visible. In another case observed by Abrahamson the foreign body had lain in the lens for eighteen months and only the latter contingency of a contusion of the same eyeball with rupture of the lens, brought the patient to the physician's, where the splinter was removed by the giant magnet with the result of the speedy absorption of the entirely opaque lens.

It occasionally happens that small foreign bodies that have penetrated into the lens and remained there for years, cause only very small circumscribed opacities without any optical or physiological disturbances of the function of the lens. Three analogous instances which I intend to describe below, are not devoid of interest, especially in regard to pathology, as I had the opportunity to follow them up for years.

Case 2: I. H. J., aged twenty-four years, painter, consulted me on January 5, 1919, and told me that he had been struck in both eyes by the explosion of a hand grenade on May 18, 1918, when a combatant at the front. The eyes had ached at that time but at present were causing him no trouble. He wanted glasses for work. Findings: O.D., small foreign bodies under the skin of the upper lid. The cornea showed in its center numerous larger and smaller spots due to impacted foreign bodies. One spot showed a dense white center, while the others extending from the center downward, showed a delicate linear condensation. In some of these spots there was centrally a tiny whitish

foreign body, and under the bulbar conjunctiva discrete blackish ones which were especially visible near a slightly retracted, irregular, small scleral scar of about 3 mm. in length and of a delicate brownish tint. The scar lay about 7 mm. outward from the corneoscleral junction in the horizontal meridian. The eye was completely quiet, only close to the scar its surface was slightly injected. The anterior chamber was of normal depth. Outward and below about eight o'clock there was a small pigmented synechia in the surroundings of which—immediately downward from it—the anterior capsule showed a fine gray, tiny opacity. In the otherwise normal iris tissue lay a very fine black vertical cleft which was hardly visible when the pupil was dilated. The pupil was round and reacted promptly. The lens contained a whitish, lusterless, foreign body. The latter had an irregular, nearly rectangular form, a fairly rugged anterior surface and a slightly oblique position, while the larger face of that rectangle was looking straight forward. Its inferior edge lay a little more backward than the upper, with dilated pupil, focal illumination and movements of the eye outward and downward, the foreign body which was about 1.5 mm. long was very easily visible. In its vicinity there was not the slightest trace of opacity nor any connection between the foreign body and synechiæ (the opacity channel), either on oblique illumination or with the loupe or when placing a plus 20 D. glass behind the mirror and approaching the eye as much as possible, or with the corneal microscope or the slit lamp. The lens nowhere revealed the formation of droplets, whilst the most posterior layers of the lens showed in the outward inferior quadrant a very finely dashed opacity which began a little peripherally from the foreign body and grew a little denser towards the equator. Yet here also red light was reflected everywhere from between the short streaks.

The vitreous showed minute granular opacities. The optic disc appeared slightly congested and well defined, its vessels were somewhat dilated, and tortuous veins were present on both sides. The macula was normal. From about the scleral scar started a grayish white fibrous mass which protruded into the vitreous body and bore at its central extremity a larger, glistening white foreign body in part enclosed in connective tissue. The vitreous contained, outward and below, delicate fibrous cords. From the region of the scar extended towards the center in a roughly horizontal line a tongue-shaped chorioretinal rupture. It measured several p.d. in length, was of light-yellowish color and in its center covered by a mass which projected into the vitreous body and had a soft gray hue; only the borders of the rupture were somewhat more pigmented. A retinal vessel dipped into its apex and disappeared there. Next to this tongue which measured at its widest place still within reach of the ophthalmoscope, two p.d., and at its central end 0.25 p.d. or so, there were delicate discolored foci. Along with a large number of minute bright-white glaring foreign bodies in the vitreous in front of the rupture, there was a foreign body of somewhat larger dimensions. Vision 5/10 with correction; refraction plus 4 D.

O.S.: Foreign bodies impacted in the bulbar conjunctiva, otherwise absolutely normal, with refraction plus 5 D. and corrected vision 5/5.

An attempt with the giant magnet caused the patient to complain of violent pains in the right eye and proved a failure; the iron foreign bodies englobed in the eyeball did not move.

On February 5, 1928, after nine years, I saw the patient again and an accurate examination gave the very same findings as in 1919.

Case 3: B. H., forty-two years of age, tinman. He presented himself with the complaint, that on the preceding day, whilst he was hammering black iron, a splinter had hit his left eye and he had suddenly felt severe pains in the eye. The examination showed normal visual acuity for both eyes. O.D. was entirely normal. O.S.: the cornea exhibited a grayish-white perforation about 3 mm. long which started central-

ly, extended in linear course to the temporal side and ended at its temporal extremity with a clavate thickening. The anterior chamber was normal. On the temporal pupillary border of the iris there was a very small lesion somewhat retracted, but not transilluminable. The crystalline was clear and easily transilluminable with the exception of a small area temporally which allowed of exact study only when the pupil was dilated.

On focal illumination a small grayish-red and somewhat bright opacity the size of a pin head became visible. It emitted two short twigs, the one of which extended forward and towards the pupil, the other backward and to the temporal side. By transmitted light the opacity revealed a curved line with convexity downward. In its center lay the dark gray to brownish-red foreign body of compact appearance. With high magnification and suitable movements glistening surfaces and jagged and serrulate borders were revealed. One linear opacity stretched downward and backward from each. The anterior line was sharper and made up of very dense gray streaks, the posterior had a gray-red faded color and indistinct outlines. In the concavity of the whole streak of opacity, immediately above the foreign body, there was an accumulation of brown-red dots which lay closely side by side and were surrounded by a large number of minute dark gray, muddy lines which resembled splinters. The whole of the streak opacity was situated in the region of the nucleus of the lens. The vitreous body was quite normal and transparent, without any opacity. The fundus, temporally from the optic disc, presented a white chorioretinal defect of roughly pentagonal shape with a reddish tinge. Its size was 1/4 p.d., its borders were quite sharp, and showed a slightly pigmented rim. Small normal choroidal vessels crossed it. Otherwise the fundus was quite normal without hemorrhages, degenerative foci or vascular alterations. The optic disc offered an absolutely normal aspect. The tension was normal, 18 mm. (Schiøtz). Refraction showed emmetropia. The attempt to remove the foreign body by the giant magnet failed, it is true, but provoked no sensation of pain. The examination of the patient's general condition gave normal findings.

This patient reported repeatedly for the purpose of control. The examinations of October 2 and December 4, 1919, and that of January 5, 1920, disclosed a little discrepancy only inasmuch as the lenticular opacity had taken on a darker gray color and its outlines had become sharper, while the pigment dots around the foreign body were reduced in number, but had become a bit darker. The opacity of the lens had not increased then nor at later examinations on March 5, May 20, 1920, June 3, 1923, June 25, 1925, November 9, 1927, and March 4, 1928. The acuteness of vision of both eyes was always 5/5, the opacities remained stationary and the ocular media were keeping their physiological balance.

Case 4: J. S., eighteen years of age, iron turner, consulted me on December 26, 1919, and stated, that a week ago an iron chip had struck him in his right eye causing fairly violent pains. The visual acuity of this eye decreased after the third or fourth day following the injury, so that he could now hardly see with that eye. Examination showed both a deep corneal scar which lay in the horizontal meridian more to the temporal side, and correspondingly in the pupillary portion of the iris a small injured area and a small opacity in the lens. The opacity itself was likewise located rather temporally. It was easily visible only when the pupil was dilated, and consisted of a brown-red to gray center giving slight reflections on movement and of a surrounding, tenuous, grayish-white opacity with indistinct borders. The length of the whole opacity which lay between the nucleus and the anterior cortical region, was 2 to 3 mm. At the posterior pole of the lens lay a subcapsular and frank, but slight, opacity of the posterior cortex in the form of a stellate cataract. There were no opacities in the vitreous body. The visible parts of the eyeground showed

no peculiarities when the pupil was dilated. The bulbar tension was normal, 20 mm. (Schiøtz). Refraction showed emmetropia. Vision, with strongly dilated pupil, 5/70. The left eye was normal.

The attempt at extraction by means of the giant magnet failed. On January 13 the same finding was obtained, but the opacity of the posterior cortex showed a marked tendency to clear up. On January 26, 1920, the opacity of the posterior cortex began clearing up. On February 2, 1920, vision was 5/30; on May 14, 1920, it was 5/20; on August 20, 1920, 5/15. No correction was possible. The opacity of the posterior cortex was in a fair way to regression, only some fine linear and punctiform light gray opacities were still perceptible. On May 7, 1921, and June 20, 1922, no change was observed. On March 14, 1923, August 2, 1925, and November 29, 1927, the eye was quiet. The anterior lenticular opacity and the foreign body were totally unchanged and out of the opacities of the posterior cortex only the aforesaid light dots and lines which had remained stationary, were still visible. The visual acuity remained 5/15.

We have here three instances of rare injury in which the foreign body was embedded in the lens without producing any opacity or, when an opacity happened to result, it was so small, that it did not at all interfere with the physiological function of the damaged eye. Granted that in most cases traumatic lenticular opacities, at first stationary, develop into total cataracts after many months or even years, my cases evidence, beyond all question, that they can also remain entirely unchanged for quite as long, and that they need not develop at all around the foreign body. These cases evidence in addition, that foreign bodies embedded in the crystalline can dwell there for some time without provoking any harmful reaction, as I had the opportunity to observe for ten years in case 2 and for eight years in cases 3 and 4.

It stands to reason that the nature of the penetrating foreign body and the circumstances of its invasion decide whether the lenticular opacity will become total or remain stationary and whether the lens will be completely traversed or the foreign body lodge in it. In these respects not only the size, form and material of the foreign body are of importance, but also the velocity with which it impinges against the eyeball, the angle at which it strikes the globe, and the nature of the tissues which it has to cross before reaching the lens. It is obvious that small foreign bodies damage the crystalline less than do larger ones. Foreign bodies of flat shape and with sharp edges cause by their transit smaller, quicklier closing wounds; thus so small a cleft may result, that the aqueous humor cannot come into contact with the crystalline lens nor induce progression of the opacity. Likewise foreign bodies impinging with great velocity occasion small wounds rather than lacerations or displacements of the organ. The fact must not be lost sight of that often the bare impact of the foreign body on the crystalline lens produces a sudden concussion, a sudden divergence of the lenticular fibers, in short a "lens shock" which may, by the abrupt change of the conditions of diffusion in the lenticular tissue, also give rise to the development of opacities.

The material of the foreign body is of no slight consequence. It is well known that many metals remain in the globe—and hence in the lens—without causing any discomfort. Iron and copper are still believed to meet with the least degree of tolerance, although the histories of my three cases show that iron, too, can lie in the lens for years without interfering with its optic function or inducing siderosis. In case 2 the splinter had proceeded from a hand grenade and also the trial with the magnet had been positive; in case 3 it could be established with certainty, that the chip had flown off from black iron plate and, in spite of the negative result with the magnet, the diagnosis "iron" could not be ruled out. Also in case 4 it could be surely established that the splinter was of iron. What chemico-biological conditions reign in the crystalline lens so

as to cause the retained iron splinter to induce siderosis much more rarely than it does in other parts of the eye, particularly in the iris and choroid? This is a question which needs further investigation.

The form, size and seat of the lenticular opacities in my last three cases deserve special mention. As case 2 shows, the iron splinter had been embedded in the lens for ten years without causing any opacity even close to its site. Also in case 4 only a minute circle around the foreign body showed a grayish-white opacity. The opacity was extensive in case 3 in which it formed a slightly curved line and somewhat resembled a fusiform cataract.

The place where foreign bodies will mostly become stuck is the zone between the nucleus of the lens and the adjacent cortical layers, particularly the anterior ones. This location suggests that the foreign body, its kinetic energy already partially spent, meets in the harder nucleus with successful resistance. However, if the kinetic energy of the foreign body allows it to enter the nucleus, it advances in the great majority of cases as far as the retrolenticular tissues of the globe. It is strange, that we encounter in case 4, besides the small opacities quite close up to the foreign body, the perfect picture of the subcapsular so-called stellate cataract of the posterior layers of the lens and also in case 2 the rudimentary form of such a cataract. One would be prone to explain the origin of that star-like form of cataract by posterior tears of the capsule and the secondary penetration of substance of the vitreous body, but for the findings obtained. I myself think that it can be attributed to the lens "shock." One of its features is the sudden, transient detachment of the posterior lens capsule and the consecutive sudden change of the intralenticular conditions of diffusion. Opacities of the posterior layers of the lens of traumatic origin are now considered capable of recession and I, too, could observe the clearing up of such opacities in my own cases.

When a foreign body penetrates the eyeglobe, those parts which it has to traverse to reach the lens play a very important rôle, especially the cornea and the iris. The first, because in such injuries it serves in most cases as passage, the latter, because it favors the conditions for the arrest of the foreign body. The cicatrix that betrayed the point of perforation was in all my cases to be found in the cornea, the lamellar structure of which is adapted for decreasing the velocity and kinetic energy of the piercing foreign body and promoting its blockage in the crystalline. More energy is lost in the passage through the spongy, contractile tissue of the iris, the injuries to which are mostly so small as to be invisible. In my own three cases they were so slight that they could only be detected under special magnification. The iris is likely to play no slight part in all those cases in which the eye remains quiet although the foreign body remains in the lens with or without production of only insignificant opacities. When the foreign body is traversing the iris in order to enter the lens, the iris is pressed against the lens and the small scar of the lens capsule is temporarily glued together with the iris tissue. So the aqueous humor of the anterior chamber cannot invade the lenticular tissue, which fact, no doubt, aids in preventing the development of extensive opacities. The corneal, iridic and lenticular wounds are usually located in the same line.

In all these injuries the retrolenticular tissues of the eyeball are not particularly involved, and where such pathological changes occur in my first case, a second splinter is likely to have been at work, taking a route quite different from the first and being directly thrust into the retrolenticular tissues, where it provoked the local lesions.

Changes of the vitreous body in the form of fine granular opacities and cicatricial changes in the choroid and retina were only to be found in case 2 in which, as has already been remarked, a second foreign body had perforated the eye coats and was at the same time directly visible in the vitreous body,

whereas the latter was completely intact in cases 3 and 4. Case 2 is also a classic example of those rare instances in which simultaneous penetration of several foreign bodies into the eye can be ascertained. One of them which lay in the lens, as we have already learned from the history, had passed through the cornea and iris, the other had pierced the sclera, choroid and retina, causing their rupture with secondary proliferation of the connective tissue, and floated in the vitreous, shut in by connective tissues which had issued from the area of rupture. A quite different fundus picture was seen in case 3 in which there was the aforesaid white, pentagonal, small area which represented a choroidal rupture. Such gaps in the fundus, mostly in the macula itself or in the macular region, have frequently been interpreted as injuries due to contusion and this may, indeed, also be true of my case, because the only splinter which had pierced the eye became stuck in the lens. Doubtless, a foreign body which enters the eyeball exerts on the tissues, in addition to its perforating effect, a contusing action too. The origin of such gaps in the fundus is regarded as indirect. When contusion of an eyeball entails in the fundus a circumscribed hemorrhage, a rather circumscribed form of Berlin's opacity or Purtscher's retinal lesion, it is possible that such gaps may be left behind. In case 3 it might be assumed that the contusion gave rise to an intraretinal hemorrhage the pressure of which on the retinal tissue caused one circumscribed circular, atrophic area. Yet the fact of the defect's being visible in its full definite form very soon after the injury, is in favor of a rupture. The eyeground in case 4 was negative.

From the therapeutic standpoint it is of extreme importance to know how to deal with such foreign bodies as are well tolerated. Opinions differ here no less than in other fields. Some advocate removal of such splinters, others declining to remove them. Some demand the removal of foreign bodies of the lens on principle, despite their having occasionally proved to be tolerated for years without inconvenience. On the other hand a great many cases recorded in the literature, besides my own, show that one can choose expectant treatment unhesitatingly. Of course, every case requires individual management, and the removal of splinters which cause irritation of the eye or progress of the lens opacity.

On the other hand, there is no categoric indication to remove foreign bodies that are tolerated by the eye without any inconvenience whatever; for such a condition, although it compels watchfulness, is certainly a lesser menace to the eye than is removal by means of the magnet with its accompanying dangers such as hemorrhage, consecutive total opacification of the crystalline lens, and inflammation.

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POSTTRAUMATIC OCULAR TUBERCULOSIS

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Eye lesions following trauma are described in two cases. The one is certainly, the other probably tuberculous. The literature is reviewed for similar lesions. Read before the American Academy of Ophthalmology and Otolaryngology, October 21-25, 1929.

Posttraumatic ocular tuberculosis is an infrequently observed occurrence. Our own experience is limited to two cases, one of which is not unequivocal, and a search through the literature resulted in a rather meager yield.

Case 1

Mrs. D. H., age seventy years, was first seen in October, 1926. Aside from incipient cataract with well marked radial opacities in the lenticular cortex, both eyes were free from abnormality. She was given dionin and potassium iodide solution, and by November, 1927, the lenticular opacities had advanced to a degree to make operation seem advisable. A combined iridectomy and extraction was done under local anesthesia on November 15, 1927. The eye healed satisfactorily. On discharge from the hospital November 28, 1927, it was grossly normal with only slight hyperemia and a white mass presumably of lens cortex in the pupillary area. A slit-lamp examination on this day revealed a shallow anterior chamber, with a large white mass, possibly exudate, interposed between the center of the cornea and the vitreous which presented in the pupillary area. The vitreous bulged so that it was nearly in contact with the cornea, and it was heavily sprinkled with large and small pigmented deposits. The iris was adherent to the vitreous and had several widely dilated bloodvessels visible in its tissue. With correcting lens the eye had a visual acuity of 6/10.

In January, 1928, the eye was still hyperemic, the media somewhat hazy, and the visual acuity 6/12. In February the eye was more red and a rather thick plastic exudate filled the entire coloboma of the iris. Deep corneal vascularization was observed and the dilatation of the iris vessels was striking. She was seen occasionally during the year (she came from another city). In October, 1928, we noted that the iris presented a picture typical of tuberculosis. The cornea was opaque and vascularized in the upper quadrant and there were very numerous unpigmented postcorneal deposits varying from the finest granules to large lardlike masses. The anterior chamber was shallow. The iris was firmly bound to a pseudomembrane of plastic exudate which filled the pupillary area and by its contraction displaced the iris upward. Only two small openings into the posterior chamber could be found. Distributed through the iris stroma were nine pearly grey, translucent, protruding masses, chiefly peripherally placed, though one or two were in the pupillary zone of the iris. Many of them were surrounded by dilated bloodvessels. Krückmann's plate in the Graefe-Saemisch Handbuch illustrates this clinical picture precisely. An internist who examined her generally at this time made a diagnosis of active pulmonary tuberculosis based chiefly on the presence of fine râles over the upper right lobe and a loss of one-fifth of her body weight. There was little rise in temperature. The Wassermann reaction was negative.

In August, 1929, the eye was free from hyperemia, the posterior surface of the cornea had become practically free from deposits, and the lesions interpreted as tubercles had begun to undergo retrogression. Most of these were replaced by atrophic spots in the iris stroma.

To be sure, the iris picture here is not pathognomonic of tuberculosis. There is probably no form of tissue reaction in the iris which can definitely be traced to only one particular etiological agent. However, in the presence of an active tuberculous process in the lung, a nega-

tive Wassermann reaction, and an iris presenting a clinical appearance which has until recently been generally considered as pathognomonic of tuberculosis, it seems probable that the iritis in this case was tuberculous.

Case 2

A child seen at the Milwaukee Children's Hospital exhibited bilateral iritis following trauma to one eye. The child, ten years old, was struck in the eye with a piece of ice, without rupture or penetration of the eyeball. Two months later his vision was greatly decreased, and he entered the hospital with a bilateral uveitis and partial cataract. The iris in each eye was swollen and there were many synechiæ, and a thick membrane of plastic exudate in the pupillary area, as well as numerous thick unpigmented postcorneal deposits. Tuberculosis was suspected, but the internist could find no evidence of a tuberculous focus elsewhere in the body. There was no rise of temperature, no reaction to an injection of one milligram of old tuberculin. A satisfactory x-ray plate showed no evidence of intrathoracic tuberculosis. Liver and spleen were not palpable and the Wassermann was negative. Despite the vigorous local treatment with nonspecific protein therapy, administered during a long stay in the hospital, the eyes grew steadily worse. One year after the injury, translucent, sharply defined greyish swellings were seen in the iris. The appearance of the iris was in every way as characteristic of tuberculosis as in the first case described. Of course the negative Wassermann reaction does not entirely rule out syphilis, but it surely is more significant than the negative findings in a search for tuberculosis. It is also impossible to say whether the iritis is secondary to a form of infection neither tuberculous nor syphilitic. The possibility of sympathetic ophthalmia must be considered, but in the absence of evidence of perforation of either eyeball this thought has scant support.

In his collective review in the Graefe-Saemisch Handbuch Wagenmann mentions four cases similar to our second one, but none like the first. Dr. Jonas Friedenwald was kind enough to send us the following note on a case observed by him:

"The patient was a young man who had recurrent hemorrhages in the vitreous over a period of a year or more. Cataract eventually developed and was extracted (not by me). Following the extraction a severe uveitis developed and the eyeball had to be enucleated. The histological examination showed a conglomerate tubercle in the flat part of the ciliary body which had discharged into the vitreous. There were miliary tubercles on the surface of the iris, on the under surface of the cornea, in the iris stroma, about the canal of Schlemm, in the sclera at the limbus, and in the episcleral tissue. There were also miliary tubercles in the choroid far anteriorly and about the retinal veins. The retina was completely detached; lens absent; beginning phthisis bulbi. The case presents a beautiful confirmation of Dr. Verhoeff's theory that tuberculous kerato-iritis is the result of a discharge of tubercle bacilli into the vitreous from a localized caseous lesion in the ciliary body or farther back in the eyeball."

F. W. Block reports his observations on a patient whose eye had been injured by a red hot splinter of iron. One month later he entered the clinic with a severe iritis, with hypopyon and numerous synechiæ. The cornea was hazy and had a linear scar. The eye healed under local treatment but a linear iris defect was discovered under the corneal scar. No evidence of intraocular foreign body or syphilis was found. The iritis recurred and a diagnosis of tuberculosis was made on the basis of the reaction to tuberculin. Block found no similar cases in the literature. He mentioned Müller's case of intraocular tuberculosis following a perforating injury as doubtless ectogenic.

120 East Wisconsin avenue

Reference

Block, F. W., Klin. M. f. Augenh., 1921, v. 67, p. 581.

A CASE OF CORECTOPIA

ARTHUR A. KNAPP, M.D.
NEW YORK

As shown in the drawing, the pupil was displaced to the temporal side. Over the temporal portion of the pupillary area of each cornea was a vertical crescent of opacity. The iris was almost in contact with the cornea in the region of this crescent. It is assumed that the condition resulted from a fetal iritis. Presented before the section of ophthalmology of the New York Academy of Medicine, May 20, 1929.

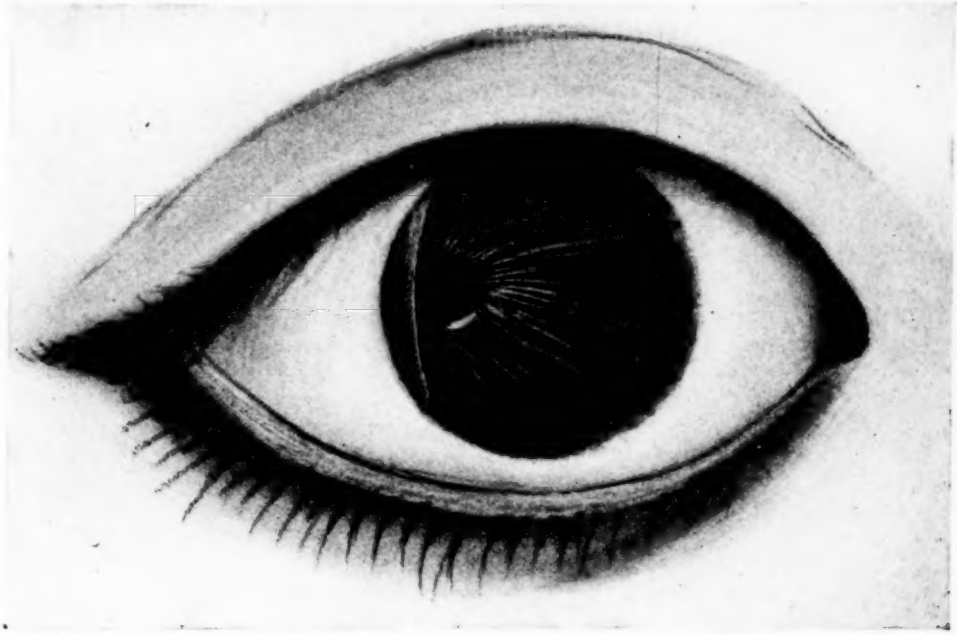
R. G., male, aged five years, a native of Porto Rico, presented himself at the eye clinic of the City Hospital dispensary, complaining of stumbling and falling while at play.

There is nothing of note in the family history. Likewise, the previous history is negative. There has never been any inflammatory ailment of the eyes; nor has there been any operation.

Ophthalmological examination: Vision in each eye, as well as could be determined, is good. The most conspicuous feature of the eyes is the eccentric pupils, each one being displaced temporally and somewhat superiorly. They are small, the left a little smaller than the right. Reaction to light and accommodation is normal. The nasal side of each iris is arranged in radiating folds and appears to be stretched toward the pupil. To the temporal side of each pupil there is a little band of iris tissue, continuous with the iris above and below; but to the nasal side this band is reflected anteriorly in the direction of the cornea. Both eyes are prominent. The lids and conjunctivæ are normal. Over the temporal portion of the pupillary area of each cornea is a vertical, linear opacity, making a small crescent. The anterior chambers appear shallow. There is no muscular imbalance.

With the McLean tonometer the tension of the right eye is 85 mm., that of the left eye 70 mm. The interior of each eye is negative; there is no coloboma of the choroid.

Examination with the slit-lamp: In the right eye a deep white line is seen,



Corectopia (Knapp).

including a small segment of the cornea, about one-sixth its width. The iris is adherent to this white line, being almost in contact with the cornea between it and the limbus. From this line toward the outer edge of the pupil, a small part of the iris is seen reflected backward. In the left eye the pupil is displaced higher up. There is also a white line here, but smaller in size, and including a smaller crescent of the cornea toward the limbus. Another white streak is seen on the lower edge of the pupil. The iris is adherent to the cornea and is reflected on to this white line exactly as in the other eye.

The gonioscope shows the following: In the right eye the pupil is seen displaced toward the temporal side, ending abruptly and simulating a coloboma, toward the limbus; but a narrow strip of the temporal part of the iris is seen reflected against the cornea and then coming down. The ciliary processes are very apparent. The orbiculus ciliaris and the edge of the lens are clearly seen. The left eye presents similar changes, but the pupil is smaller.

The latter analysis makes the diagnosis one of corectopia rather than coloboma, since there is a band of iris tissue peripheral to the pupil, which is displaced temporally.

This anomaly is of unknown etiology. Some believe it to be a developmental condition; others, that it is the result of a fetal iritis. This case seems to fall into the latter classification.

Dr. M. Uribe Troncoso was kind enough to make the gonioscopic examination.

I wish to thank Dr. Wiesner for his kind permission to present this case.

(Supplemental note at the time of going to press: Both eyes are myopic. The lenses are normal. There is a slight epicanthus on each side. The left palpebral fissure is greater than the right. Measurements of palpebral fissure: O.D. 11 mm., O.S. 12 mm. Corneal diameters are: O.D. vertical 12 mm., horizontal 11.5 mm.; O.S. vertical 12 mm., horizontal 11 mm. Exophthalmometer readings: O.D. 15.5 mm., O.S. 16.5 mm.)

2021 Grand Concourse.

SOCIETY PROCEEDINGS

Edited by Dr. Lawrence T. Post

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

April 16, 1929

Dr. W. Holbrook Lowell presiding

Hemorrhage following chalazion operation on a bleeder.

Dr. W. D. Rowland reported the case of a male aged thirty-three years, draftsman, seen March 12, 1928, concerning a small chalazion in the middle lower right lid, which had existed for six months. This had been incised by his family physician one month previously. It was removed April 17, 1928, by conjunctival incision and curettage, using butyn by instillation and a few drops injected. No unusual bleeding occurred, a pressure pad was applied with ample adhesive, and the patient went home with his wife and a friend.

Just after the operation the patient remarked that he was a bleeder and had almost lost his life on some previous occasions. He was instructed to lie down and be quiet on returning home and to report immediately if bleeding occurred. That evening Dr. Rowland was notified that this patient had had a stream of blood running down his cheek for thirty minutes. Ice bags and pressure were advised and, after failure to effect control in an hour, the patient was seen again at the office. The dressings were saturated and a stream of watery blood was trickling down the face. Pressure over the wound or upon vessels availed nothing. Finally a chalazion forceps stopped the hemorrhage but this immediately recurred upon release of the forceps, so the instrument was replaced and hospitalization suggested. The patient elected to return home. The next day at 1:30 p. m. the wound was found dry and the patient had had a really comfortable night in spite of the cumbersome apparatus. The skin was discolored under the clamp. After waiting for perhaps ten minutes a firm dressing was carefully applied. Hemorrhages recurred before the patient reached home. Three days later his family physician, who had seen him through several kidney hemorrhages, was desired by the patient. The physician reported apparent control by calcium lactate and thromboplastin, but in thirty minutes he was obliged by recurrence of the bleeding to send the patient to a hospital. On the seventh day Dr. Rowland was called and found a large black mass, one-half inch in diameter, protruding about one inch over the skin area, and straw colored blood slowly trickling down the cheek. Open treatment seemed better than any dressing, there being better clotting and less fresh bleeding because of the reduction of manipulation. The patient had had calcium lactate, thromboplastin, and ergot. He was eating well, had a temperature of 100.4 degrees and a pulse of 100; but he was almost fatally discouraged. Three days later, no bleeding had occurred for forty-eight hours. He was quite white, hemogloblin was 34 per cent, but he was cheerful, and he left the hospital after two weeks. He had a slow convalescence and returned to duty in two months. When seen six months later for removal of a corneal foreign body, scarcely any scar could be detected in the lid.

The patient had been kept quiet in bed on a nourishing diet. At first there had been attempts to control the bleeding by instilling cocain and adrenalin and injecting the latter. Later the open air treatment had been adopted. On the second day, thromboplastin 20 c. c. and hemostatic serum 5 c. c. were given every four hours, also calcium lactate, in ten-grain doses (frequency not stated). This apparently was continued until bleeding stopped on the eighth or ninth day. Blood counts showed: red cells 3,000,000; white

10,000; hemoglobin 65 per cent; later red cells 2,700,000; hemoglobin 34 per cent; and on discharge hemoglobin of 60 per cent.

The past history obtained after convalescence showed that in childhood one very severe hemorrhage had occurred from an injury to the hard palate. At the age of fourteen, while living in Paris, the extraction of a tooth was followed by almost fatal bleeding, lasting fourteen days. From then until the age of nineteen years many nose bleedings had occurred with equal seriousness. Again in 1927, during scarlet fever, a bothersome nasal hemorrhage had lasted four days. Several attacks of bleeding from the kidneys had occurred within the past ten to fifteen years. Extensive bruising occurred on the least trauma. Superficial cuts, such as in shaving, gave little or no trouble. For several years a type of arthritis had been somewhat disabling, and, when muscles were involved, much discoloration ensued.

Discussion. Dr. Greenwood reported the case of a man from whose lid he had removed a chalazion. The bleeding took about six hours to stop. He did not know beforehand that the patient was a bleeder.

About twenty years ago he was called to Medford to see a boy whose upper lid had been operated on by a local surgeon. Blood was pouring out of the hole. The boy had been bleeding for three days and was pretty white. Dr. Greenwood devised a little clamp of sheet lead, making a disc about the size of a one cent piece and cutting a hole in the center of it, and attaching it to the lid clamp with a strip across the forehead. He put gauze on both plates, clamped them on and kept them on for three days. There was very little sloughing. The bleeding was so great that the patient became unconscious, but he had a transfusion and recovered after severe illness.

Cilium in anterior chamber thirteen years

Dr. H. B. C. Riemer reported that on March 27, 1929, a man of nineteen years had entered the out-patient department of the Massachusetts Eye and Ear Infirmary complaining of a strained feeling of the left eye. When he was six years old the right eye had been injured by a piece of wire which caused a puncture wound.

Vision of right eye was 20/200 plus, with 2.50 sph.=20/70; that of the left eye 20/20 plus, with 0.75 sph.=20/20. The right eye showed iris caught in the old scar at the limbus. The media were clear, the fundus normal.

Iridotomy to correct the displaced pupil was done on April 2, 1929. Before operation, with the slit-lamp a strand of fibrous appearance could be seen lying on the iris. After keratome incision it looked more like a cilium. It was easily removed with iris forceps and proved to be a cilium which had been in the eye about thirteen years, causing no reaction. April 8, 1929, vision of right eye was 20/200 plus, with +1.00 sph. plus 4.00 cyl. axis 180°= 20/30; left eye, 20/20 plus, with 0.75 sph.=20/20.

Foreign body in vitreous for one year

For Dr. J. J. Regan, Dr. E. B. Dunphy presented this patient, a twenty-three-year-old mechanic. He had 20/20 vision in either eye. Dr. Regan noticed a small whitish mass near the retina at the nasal side of the disc and found that the man had been struck in that eye while hammering one year ago. X-ray showed a small foreign body, to the nasal side and 15 mm. back. There was no discomfort and apparently no siderosis. The foreign body had been in the vitreous for one year.

Discussion. Dr. F. H. Verhoeff felt there would be very little chance of getting the foreign body out and that trying to do so would endanger the sight of the eye.

Unusual case of chorioretinitis

Dr. J. J. Skirball presented a male, twenty-eight years old, who had been placed on intensive treatment July, 1928, for a primary lesion. At this time his eyes showed no manifestations of lues. Vision in each eye was 20/30.

On October 27, 1928, he showed ac-

tive luetic iritis involving both eyes. This ran a moderately mild course, and recovered about December 3, 1928, with vision of 20/30 in each eye.

On March 7, 1929, vision right eye was 15/200, left eye 20/200. There were no external abnormalities. Fundi showed marked edema of each retina and a large proliferated area of exudation extending horizontally from the nerve head above the macula to the periphery, the left eye being less involved. The process grew intensively worse, involving almost the entire retina, with massive exudation and some wrinkling of the retina above the nerve head in the left eye.

At the present time there was some dissemination, although the process appeared to be considerably more quiet. Vision was 20/200 in each eye.

The striking facts about this case were that the whole process was of only one month's duration and the patient was under intensive antiluetic treatment from the beginning of his infection.

Unusual muscle reactions

DR. E. B. DUNPHY showed a little girl who had normal vision in the right eye and 20/200 in the left eye; no binocular vision. The fields were negative and the eyes perfectly straight. She could not utilize the external rectus muscle in either eye to any extent. When she tried to use the internal rectus muscle the eyeball withdrew into the orbit and the palpebral fissure closed down. A number of cases had been reported involving one but not both eyes.

Keratoglobus or megalocornea

DR. T. L. TERRY presented the case of a young man twenty-three years of age, who while being examined for foreign body on the cornea was found also to have extremely large corneas with unusually deep anterior chambers. The right eye showed arcus juvenilis over one-third the circumference of the cornea in the lower temporal region. Measurement of corneas showed horizontal and vertical diameter of 14 mm. for left eye, and 15 mm. for right eye. Anterior chamber appeared at least two millimeters deeper than normal. Refraction showed compound hypermetropic astigmatism of small degree. Visual fields and blind spots were normal. Fundus showed no pathology. Biomicroscopy showed a very fine branching opacity of anterior lens capsule of right eye. There was not the slightest trace of corneal opacity other than the arcus juvenilis. Tension in each eye was less than 12 mm. (Souter).

Some authorities considered megalocornea as part hyperplasia and part gigantism. Others said it was always a part of an infantile glaucoma which had undergone spontaneous cure.

Spontaneous dislocation of the lens, early opacities of the cornea of the arcus senilis type, and dissemination of pigment from the iris had been mentioned as complications occasionally fatal to the eyes.

Syphilis of tear sac

DR. BENJAMIN SACHS presented a seventeen-year-old girl who had an inflammatory swelling in the region of the tear sac. She was being treated for acute dacryocystitis without relief. Examination showed an indurated mass near the inner canthus which seemed to be associated with the tear sac. It was possible to syringe fluid into the nose. X-rays of the sinuses were negative and a blood Wassermann was negative. The patient was given potassium iodide solution, ten drops three times a day, and there was rapid improvement.

A similar case had been presented by Dr. Sachs a few months ago.

Oxycephaly

DR. WILLIAM BEETHAM presented a musician, thirty-one years of age, complaining of poor vision for twelve years. There was a negative family history. Health had been excellent until onset of present illness. Parents remarked that when young he had a small head with a high forehead. He went to grammar school through the sixth grade and played in an orchestra until nineteen years of age. Then he was

confined to bed five weeks with double pneumonia. During this time he noted rapid failure of vision together with loss of the sense of smell. Two weeks later he noticed that the right eye turned out and both eyes were prominent. Vision had improved a little during the next two years, but for the past ten years had remained stationary. Right eye vision equalled counting fingers at two feet; left eye, fingers at six feet, due to simple optic atrophy with snow-white, clearly outlined discs and normal vessels. Visual fields showed small remnants in both temporal fields. There were twenty-five to thirty degrees of divergence of the right eye, with good ocular excursions, also nystagmus of ocular type. Both eyes were prominent. Head was small, with short anteroposterior diameter and high sloping forehead—rather typical of oxycephaly. X-rays of skull showed thin calvarium, convolutional markings present, occipitoparietal sutures not visible, middle fossa of skull pushed downward and forward, and optic foramina normal in shape. Blood Wassermann was negative. General physical examination was negative.

The case was interesting because of anosmia, and failure of vision coming on as late as the age of nineteen years.

Anaphylactic shock from use of foreign protein

Dr. William Liebman presented a white male, aged twenty-three years, admitted to the Eye and Ear Infirmary on March 19, 1929. That morning a chip of steel had penetrated the right eye, and had been localized four and one half millimeters above, eight millimeters nasally, and twenty millimeters back of the center of the cornea (in the sclera). Vision of right eye was fingers at three feet; left eye 20/70, with correction 20/20 plus.

Right cornea at eight o'clock meridian showed a small penetrating wound. Anterior chamber was shallow, iris of normal color and torn. There was beginning lenticular opacity. Fundus was blurred; tension normal.

At operation the foreign body was easily drawn forward into the anterior chamber with the large magnet and removed with magnetized forceps. The eye was dressed in the usual manner. In spite of inunctions infection had set in on the fifth day. After negative intradermal test, ten thousand units of diphtheria antitoxin were injected, and this was repeated daily for four doses. On March 28th Dr. Liebman was called to the patient's house and found extreme panophthalmitis; brawny swelling of both lids, chemotic conjunctiva projecting through the palpebral fissure, with marked exophthalmos. Eye movements were abolished and anterior chamber filled with pus. Vision, right eye, nil; no swollen glands. Extreme neuralgic pain extended from the posterior mastoid region through the temple to the posterior upper and lower molar region on the right side. Temperature was 98.8°, pulse 74, respiration 20.

There was no history of hay fever or asthma, or injection of foreign protein previous to diphtheria antitoxin. Finding intradermal test negative, after diphtheria antitoxin failed to check infection, one c. c. of aolan was injected intramuscularly in the lumbar region. No change in general physical or in eye condition followed. Three c. c. of aolan was injected intramuscularly at 11 a.m. the next day. The following morning at 8 a.m. the patient had moderate chills, marked swelling of lips, difficulty in breathing. He fainted four times between 9 and 12 a.m. At 2 p.m. he appeared extremely ill. The lips were so swollen that they had to be forced open to introduce liquid. Practically every joint was swollen and the entire body and face were covered with an urticaria. His radial pulse was so rapid that it could not be counted. Respiration was extremely rapid and shallow. Temperature was 100.2°. Fifteen minims of adrenalin were injected subcutaneously and hot black coffee given by mouth. This was repeated every fifteen minutes for three doses. He was immediately removed to the hospital. On admission temperature

was 99.4°, pulse 120, and respiration 25. Calcium lactate fifteen grams was administered five times daily, fluids forced, and adrenalin ordered. Patient made an uneventful recovery from shock and on April fourth the inflammatory symptoms had receded to such an extent that an evisceration was easily done. The patient made a normal recovery.

This case was evidently one of delayed anaphylactic reaction following four daily doses of ten thousand units of diphtheria antitoxin. It was interesting to note that for three days preceding the use of the antitoxin the temperature had ranged from 99° to 100.8°. During the period when antitoxin was administered the temperature ranged from 98° to 99° but the pulse during the entire stay in the Infirmary ran well up into the eighties.

The relatively low temperature and high pulse rate presumably represented the negative phase of the foreign protein reaction which came on March 30th. Of course the aolan probably had very little if anything to do with the anaphylactic shock, which was purely a delayed antitoxin reaction. Dr. Liebman agreed with Peterson's dictum that foreign protein therapy, to be efficient to the fullest extent, should be used as early as possible. In this instance a number of days had elapsed before the antitoxin was used, allowing the suppurative process to gain such headway that the beneficial reaction from the foreign proteins came too late to be of help. The speaker had frequently used twenty thousand units of antitoxin daily for ten doses without the slightest evidence of anaphylactic shock. S. J. BEACH, Reporter.

COLORADO OPHTHALMOLOGICAL SOCIETY

(Meeting held at Pueblo, Colorado)
May 18, 1929
DR. GUY HOPKINS presiding

Infantile glaucoma

DR. JOHN W. THOMPSON (Pueblo) showed a seven-months-old baby who had been first examined in November, 1928, at the age of three weeks. The mother had noticed a milky condition of the corneas immediately after birth, the right eye being worse than the left. Other than the eyes, the physical condition of the child was normal. This was the only child. The birth was normal and there had been no other pregnancies.

Examination showed both eyeballs larger than normal, the corneas being very large and hazy over the central area. The irides were not visible except for a small band in the angle of each anterior chamber. The appearance was that of aniridia. With the ophthalmoscope the margins of the lenses were visible. No satisfactory view of the fundi was possible because of the hazy corneas. The tension was markedly increased.

Eserin and pilocarpin had been used frequently, in addition to massage of the eyeballs, for four days, after which the margins of the irides showed in each eye in their upper halves, and haziness of the corneas was less, especially in the left eye. The treatment had been continued, and at the time of report the haziness of the left cornea had entirely disappeared. Some haziness remained in the right cornea. The iris of the left eye had been pulled from the angle of the anterior chamber except for a small area between seven and nine o'clock. The position of the iris of the right eye had not changed materially. The upper half could be seen, but the lower half was retracted almost as much as at first.

The right eye was highly myopic, and only fleeting glimpses of either fundus were possible. The tension in each eye was less than when first seen but still remained high. The child seemed to see large objects. Nystagmus had developed in the last two months.

Discussion. DR. W. H. CRISP said that one individual saw but a few of these cases and that most of such cases were not taken early enough to an oculist. Sooner or later surgery became necessary to conserve vision, and trephining had for some time been the operation

of choice, although good results had been reported with iridencleisis. One case was mentioned where an iridencleisis had been done. The child had been observed for a year and the tension remained constantly under 30 mm. Hg. The visual result had been sufficient at least for the child to run about without accident.

Dr. Edward Jackson thought that the case was valuable because it had been diagnosed and observed since birth. He advised that a trephining should be done with a good conjunctival flap.

Chronic rheumatic uveitis

Dr. L. E. Thompson (Pueblo) showed Mr. F. D., who had complained of failing vision in the left eye for five months. He had noticed failing vision in the right eye one year and nine months previously. The sight in the right eye was now reduced to perception of light. The patient had had the usual diseases of childhood. He denied lues but admitted having had gonorrhea. He had inflammatory rheumatism at twelve years of age, again at eighteen, following an attack of scarlet fever, and again at twenty years. He recalled attacks of tonsillitis several years ago.

The pupil of the right eye was contracted, was fixed by posterior synechiæ, and was occluded by a membrane. The iris was somewhat atrophic. The pupil of the left eye was dilated and irregular, with several posterior synechiæ. The examination of the fundus of the right eye was unsatisfactory because of the cloudiness of the media, but no deposits or hemorrhages were seen. The vision was 20/200 minus. The tension of each eye was normal.

X-ray of sinuses showed that both antra were cloudy and that the right ethmoid cells were cloudy. X-ray of the teeth showed several suspicious roots. The tonsils were ragged, small, and full of crypts. The blood Wassermann was negative. The heart showed evidence of old valvular disease.

An interesting feature of this case was that following the extraction of a tooth a few days past the patient became suddenly blind in the left eye. The vision of this eye now was perception of light.

Discussion. Dr. Melville Black thought that no surgical interference should be attempted in this case until all foci of infection had been removed and the left eye was entirely quiet.

Dr. W. H. Crisp believed that the most probable source of infection was the teeth, because of the sudden loss of vision in the left eye after the extraction of one tooth.

Dr. E. M. Marbourg cautioned against too rapid removal of the infected teeth, because of the danger of precipitating hemorrhages. He cited two experiences where intraocular hemorrhages followed the rapid removal of infected teeth.

Congenital bilateral dislocation of lens

Dr. L. E. Thompson (Pueblo) also brought D.G., a large girl of thirteen years. She complained of poor vision in both eyes. She was wearing a +5.00 sphere. Because of her inability to read she had given up school two years before, after completing the third grade.

Examination revealed normal conjunctivæ, lids and corneæ. There was internal squint. The left eye was the fixing eye. The ophthalmoscope showed a congenital, bilateral parallel displacement of both lenses upward and outward so that the lower border of the lens crossed the junction of the upper two-thirds and the lower one-third of the undilated pupil. The fundus of the left eye after dilatation with euphthalmin was normal. The right disc seemed absent except for the temporal one-third, which was grayish in color. The vessels were of normal distribution, but smaller than normal on the right side. The patient counted fingers at eight feet with the left eye and at two feet with the right eye.

Correction of the left eye with a +3.00 sphere gave 20/70 vision. Correction of the right eye improved vision only slightly. Because of the position of the lenses, four degree prisms, base up and out at forty-five degrees, were tried. The vision was improved, and

a prism was prescribed for the left eye only.

Several months later the patient returned stating that she had attended school and done well.

Discussion. DR. EDWARD JACKSON commented on the satisfactory results obtained by simple refraction measures.

Traumatic cataract

DR. E. E. MCKEOWN (Denver) showed Josephine S., aged nine years. There was no history of injury or inflammation of either eye. At no time had there been any ocular pain or tenderness. The mother stated that two months ago she had noticed a white area occupying the pupil. Present examination of the right eye revealed a cataractous lens with an apparent rupture of the capsule in its nasal half, with protruding lens substance extending through the pupil well forward into the anterior chamber. There was no iritis or scleritis. The slit-lamp and corneal microscope showed a scar in the upper quadrant of the cornea. No foreign body was demonstrable with the x-ray. The tension was 43 mm. Hg. There was no light perception. The left eye was normal in all respects.

Discussion. DR. WILLIAM C. FINNOFF thought that a perforating injury of the cornea had occurred, with a resultant traumatic cataract. He recalled a similar case where the cornea had been perforated by a thorn and another case where the cornea had been perforated by a vegetable fiber. This fiber remained four days extending through the cornea, part in the anterior chamber and partly on the outside of the cornea.

DR. MELVILLE BLACK thought that perhaps a piece of glass or rock might have penetrated the cornea and lens, and that because of the absence of light perception the retina must be detached.

DR. EDWARD JACKSON said that occassionally an intraocular hemorrhage caused the loss of light perception.

Keratoconus

DR. JAMES J. PATTEE (Pueblo) exhibited A. G., an Italian steel worker, thirty-seven years of age. He had come in March, 1929, because of gradual reduction of vision in both eyes, on account of which his foreman had discharged him. The patient had passed an examination for industrial employment in 1915 and again in 1919. His past history was negative except for an attack of influenza in 1918. He was short and obese, with a thick neck and coarse features. All of his reactions were sluggish. He had infected tonsils and pyorrhea. The blood and spinal fluid Wassermann were negative. The urine was normal. His blood pressure was 154/110. His mentality was very low, so that he was unable to say when his vision began to fail, but in a general way it was understood to have been in recent years. There was no pain or inflammation in the eye, but both corneas showed cartridge-like projections at their centers, with some old corneal opacities. The vision of the right eye was 20/200 and of the left eye 20/70.

Discussion. DR. C. WISE was interested in the compensation side of this case and asked how such a case should be judged under the state laws.

DR. MELVILLE BLACK answered that this man was not entitled to compensation insurance and emphasized the point which had been discussed in this society many times before, that employers should be made to recognize the value of the examination of the eyes of applicants prior to their employment.

DR. WILLIAM M. BANE expressed his interest in the etiology of conical cornea. He stated that he examined his cases with particular care as to the thyroid gland, and that he had not seen a single case where the thyroid was involved.

DR. EDWARD JACKSON was inclined to believe that the endocrine glands were an important factor in the etiology of conical cornea, and that this particular case had some of the earmarks of pituitary disturbance. He did not think that the patient was blind from an industrial standpoint, and he advised that contact glasses should be given a trial.

Keratitis from lagophthalmos

Dr. Guy Hopkins exhibited Dorothy L., who was first examined February 11, 1929. It was learned that on the preceding day there had been some tenderness, pain, and photophobia of the right eye. A history of the usual diseases of childhood and frequent colds was obtained. The tonsils had been removed two years ago.

The vision of each eye was 20/20. The cornea of the right eye showed a roughly triangular opacity with its base at the inner limbus. This opacity extended on to the corneal surface for about three millimeters. It was just below the level of the lid in moderate closure of the lids. It showed a deep, old infiltration with some localized edema of the cornea. The fundus was normal. In the left eye in the same region as in the right eye there was beginning infiltration of the cornea at the limbus, and in addition, there were two small epithelial vesicles.

The general examination revealed an underdeveloped and undernourished child. The teeth were irregular and showed caries. There was a small stump of tonsillar tissue remaining in the right fossa. There was a small scar on the right side of the neck from suppurative adenitis. The blood, the urine, and the blood Wassermann were negative. The Pirquet reaction was negative on two separate occasions.

It was learned after one or two interviews that the child when asleep did not entirely close the lips. The basal metabolic rate was found to be minus 24. The patient was placed on thyroid extract and the eyes were bandaged at night. Since instituting this treatment the improvement had been satisfactory.

Discussion. Dr. Melville Black suggested exposure of the entire body to ultraviolet light. He thought that this case was of a tuberculous nature and advised the use of small doses of tuberculin.

Recurrent oculomotor paralysis

Dr. Guy Hopkins also exhibited Joe R., aged twelve years, who had come on March 18, 1929, on account of outward turning of his left eye. The same trouble had been noticed four years previously when, following an accident in which the patient was frightened but not hurt, the left eye had been noticed to be divergent. The eye remained in this position for about a week and then returned to normal. No further trouble was noticed until June, 1928, when again the eye turned outward. This same divergence had ocurred several times since, but each time apparently the eye had returned to normal.

At the time of examination in March, 1929, the vision of the right eye was 20/15, and of the left eye 20/30. The pupil of the right eye was 3.5 mm. in diameter and responded promptly to light; the pupil of the left eye was 5 mm. and was very sluggish to light. The media and fundi were normal in each eye.

The external ocular muscles seemed normal. The general examination revealed a fairly well developed and well nourished boy, normal in all respects except for a cervical adenopathy on the right side, large tonsils full of crypts, and questionable infection of the sphenoid. The x-ray of the skull was negative. The urine and the blood Wassermann were both negative.

On March 21, 1929, three days after the first examination, the left eye had turned outward ten degrees and there was no movement of this eye in any direction except in the plane of action of the external rectus and superior oblique muscles. However, there was no drooping of the upper left eyelid. Since that time the condition had gradually improved, and at the examination of today there remained only a slight impairment of function of the superior and inferior recti muscles.

Discussion. Dr. William M. Bane raised the question of the divided distribution of the third nerve according to Bernheimer, and asked why this might not be a case of crossed paralysis.

Donald H. O'Rourke,
Secretary.

ROYAL SOCIETY OF MEDICINE LONDON

Section of Ophthalmology

November 8, 1929

MR. CYRIL WALKER, president

Hereditary ptosis

MISS HAMILTON MCILROY showed a case with epicanthus and said that this condition was of rare occurrence. No cases of it had been published since Mr. Usher's in the volume of Eugenics for 1926. The patient was a girl aged thirteen years, who was seen by the exhibiter at a school clinic and later at the hospital. The other members of the family had not yet been examined, but the girl's mother was said to be mentally defective. There was a well marked bilateral ptosis, with slight epicanthus, and the head was thrown back in the posture characteristic of ptosis; the eyes were kept open by the action of the occipitofrontalis. Both nystagmus and divergent strabismus were present. Owing to the local condition and the subnormal mentality, the degree of refraction was difficult to estimate. Glasses had been prescribed because of the considerable myopia. The best vision obtainable was 6/36. Since 1922 she had been at a myopia school. She was never deemed abnormal enough to send to a school for mental defectives. A number of pedigree charts were projected on the screen.

Prismatic spectacles

MR. TUDOR THOMAS showed spectacles designed for a man who was rigid in a posture which placed the trunk almost at a right angle with his legs, so that it was with great difficulty he could see more than people's feet when walking along. The spectacles were prisms which had the bases upward, the apices pointing to the ground. The patient could now see most of the sights as he passed along.

Epithelial hyerplasia of the cornea

MR. TUDOR THOMAS said his condition had followed irritation of the eyes by fuel dust. His patient was a fuel worker, aged fifty-two years. Three years ago dust entered the right eye and this was followed by inflammation which had not since cleared up. The dust contained six per cent of pitch. There were three separate greyish white patches. They were slightly raised and gave the appearance of grey-white keratinised material. In a month or two the growth was seven millimeters in extent, and two months ago the growth had been removed, a conjunctival flap being drawn over the raw area. Three weeks later a white patch commenced to form in the limbus, and in three weeks it had extended. The vision of that eye was 6/36. The growth was removed, but it started to recur. Microscopically there was great thickening of the epithelium and there was leucocytic infiltration at the base; also there were prickle-cell nests.

Discussion. MR. TREACHER COLLINS said he did not doubt that this was epithelioma of the cornea. It did not dip down into the deep tissues as quickly as did epithelioma of the skin because of the dense character of the fibrous tissue underneath. The growth remained a long time confined to the surface. Some years ago he had recorded a case which was treated with only one application of radium. The patient died some years later without any recurrence having taken place.

Extreme atrophy of choroid and retina

MR. LESLIE PATON showed a case which gave an almost diagrammatic picture of the grosser choroidal circulation. In a similar case which he had shown two and one-half years ago there was a history of syphilis and the latter might have been responsible for the atrophy of the choroid. In both these cases there was an acquired atrophy. In the first of the cases blindness came on at seven or eight years of age and had progressed steadily, and now the patient was absolutely blind. The condition differed from those cases which were congenital.

Lattice keratitis

In this case MR. J. D. CARDELL said that with the aid of the slit-lamp a small area of hyaline membrane could be seen on the back of the cornea. In association with the membrane there were patches of pigment, and pigment could also be seen on the rods of the lattice-work itself. In both eyes there were signs of old iritis, but the membrane was present in the left eye only.

Retinitis in diabetics

DR. P. J. CAMMIDGE read a paper founded on the last thousand of his cases of diabetes mellitus. Of these forty-eight (or 4.8 per cent) suffered from retinitis and retinal hemorrhages as a complication. The percentage in Joslin's cases in America was 5.2, but van Noorden gave 17 per cent. Dr. Cammidge thought the difference was due to the particular form of diabetes met with in the various countries. It should be remembered that the cardinal symptom of diabetes, i.e., glycosuria, might arise from a variety of causes: (1) the anapothetic or alimentary, in which there was a difficulty in the storage of carbohydrates; (2) the achriatic in which there was deficiency of utilization as well as defective storage. As a rule, the former was found in elderly people and the latter before middle age. Retinitis was generally associated with the first of these forms. In forty per cent of the retinitis cases there was a history of diabetes in immediate relatives. It was now regarded as doubtful whether a retinitis due to diabetes alone ever occurred. Moreover, there was not that relation between the severity of the diabetes and the incidence of the retinitis which would be expected if the retinitis was the direct result of the metabolic disturbances consequent on the primary disease. In these patients there was a calcium deficiency of the blood and the resulting diminished coagulability of the blood was one of the factors in the production of those locally recurring hemorrhages which were of such grave prognostic significance. In these cases the systolic pressure was usually 150 mm. or more. Many patients improved rapidly in vision when the hyperglycemia and glycosuria were controlled by treatment. The edema was probably the result of alterations in the osmotic pressure in the tissues, caused by the presence of an excess of sugar in the blood. An accurate differentiation of the various types could be made only by chemical analysis of the blood under test conditions that enabled one to know what was the functional efficiency of the kidneys.

In giving insulin it was important to commence with small doses, i.e., one should avoid a sudden reduction of the blood sugar. He had found that five grains of calcium lactate daily sufficed to maintain the percentage of calcium in the blood within the normal range and to prevent further hemorrhages. Dr. Cammidge had been experimenting with both parathyroid and vitamin D, but his experience with them was not sufficient to enable conclusions to be drawn.

In conclusion, he said that the administration of lime salts by the mouth in sufficient quantity to maintain the percentage of calcium in the blood at the normal level prevented local hemorrhages in diabetic retinitis.

Discussion. DR. R. D. LAWRENCE said that under treatment about eleven per cent of his diabetic patients had retinitis, diagnosed as such by ophthalmic surgeons.

What were the real factors which caused these hemorrhages and exudates? Many people denied that there was a diabetic retinitis apart from arteriosclerosis; but he thought this was laying too much emphasis on the vascular side. All these cases had high blood pressure and albuminuria. He had a suggestion to offer in regard to the cases which did not show any ordinary arteriosclerosis, namely, that the real damage was that which was caused to the endothelium of the vessels. Another factor in the production of exudates and hemorrhages was changes in osmosis caused by the hypoglycemia. These were the cause of cataract in diabetes. Since the introduction of in-

sulin there had occurred a swelling of the lens; and forty per cent of the severe cases which he treated showed misty vision for the first few days or hours while the blood sugar was being reduced to normal.

LT. COL. A. E. LISTER asked in what proportion of the cases the retinitis had cleared up, also how the calcium was given and in what quantity. In India the proportion of diabetics having retinitis was higher than Dr. Cammidge gave. Also in that country the age period of incidence was somewhat younger, though that might be because people aged quicker in India than in Europe.

DR. CAMMIDGE replied that he had only included those cases as retinitis which were so diagnosed by an ophthalmologist. Perhaps it was because he took only typical cases that the figure was low. He agreed with Dr. Lawrence that sugar alone was not answerable, but he thought that the actual retinitis, the edema, and so on which interfered with vision were due to sugar, because those cases cleared up so rapidly when treated, especially now that insulin was available.

With regard to treatment, these people were usually elderly or very old, and he had a strong objection to using insulin for them as it was unwise to reduce quickly the amount of sugar in the blood. If these elderly diabetics were treated by dieting, they were much more comfortable and they did well, though the process might be longer than with insulin. It was his practice to do a routine estimate of the calcium in the blood, just as an estimate of sugar. He gave calcium lactate five grains three times a day in a paraffin emulsion and perhaps increased it to seven grains. It was a prophylactic measure and must be continued throughout the subsequent life.

Sarcoma of the iris

MR. TUDOR THOMAS and MR. M. S. MAYOU contributed a joint paper on this subject.

MR. MAYOU had at first thought, from the clinical appearance, that this was a cyst, especially as it seemed to transilluminate well; but his colleague had turned out to be correct when he diagnosed sarcoma. The growth was situated in the angle of the chamber and was spreading forward along the surface of the iris. It was later commencing to invade the ciliary body.

Sarcoma of the iris

MR. M. S. MAYOU read a paper on and showed slides of a sarcoma of the outer side of the horizontal meridian of the iris. The growth presented a heaped-up convoluted appearance on the surface. Vision was 6/6. The cells were of the big spindle type, such as seen in moles and pigmented nevi. These masses of pigment were scattered through the tumor.

Discussion. MR. P. STALLARD showed pictures of a case of leucosarcoma of the iris in a man aged sixty-nine years. It was removed. It consisted of spindle-shaped cells having an oval nucleus. There was marked absence of intercellular stroma.

The man was persuaded to have his eye removed, but no other abnormality was discovered.

(Reported by H. Dickinson.)

LOS ANGELES COUNTY MEDICAL ASSOCIATION

Eye and Ear Section

December 2, 1929

H. S. MUCKELSTON president

Epibulbar epithelioma: thermophore

DR. WALLACE MILLER reported the following two cases. The first was that of a man aged fifty-eight years, who had complained of a lump on the right eye of three years duration. The mass had been scraped off by another doctor but it had recurred. Two epitheliomata had been removed from the face by radium twelve years before. There was a cauliflower-like growth extending into the cornea at the nasal portion of the limbus. This was elevated about four millimeters. Three treatments with Shahan's thermophore at 140° for one and one-half to two minutes were

made at intervals of from three to four days. These had no marked effect. Then the growth was shaved off close to the cornea and the thermophore applied at 150° for one and one-half minutes, using repeated applications to cover the entire area. After three weeks only a leucoma had remained on the cornea, and there had been no recurrence in one and one-half years. The vision in the eye was now 20/20. Microscopic examination of the removed tissue showed atypical epithelial cells with a strong suggestion of malignancy.

In the second case a fifty-six-year-old man had noticed a white spot on the left eye. There was a growth four millimeters in diameter at the limbus at the three o'clock position, elevated three millimeters and invading the cornea. A clinical diagnosis of papilloma was made but a biopsy showed epithelial cells in whorls and pearl formation, and the pathological diagnosis was epithelioma. The thermophore was applied at 145° with some improvement. Two days later this treatment was repeated and then eight applications were made at three-day intervals. When last seen the patient showed no evidence of recurrence and this made the duration of cure two years.

The results obtained by the use of the thermophore had been as nearly perfect as it was possible to expect.

Discussion. Dr. A. Ray Irvine cited a case in which he had cured a patient of a recurrent epithelial tumor at the limbus by the use of the thermophore at 150° for one minute.

Dr. M. F. Weymann stated that Dr. Shahan had been quite successful in curing epibulbar neoplasms with the thermophore, but that, in his experience and in those patients of Dr. Shahan whom he had seen, a temperature of 150° had proved the most efficacious. Dr. Shahan tended to keep the time factor constant, that is, a period of one minute; and the temperature was varied to suit the effect desired. Dr. Weymann stated that he thought that Dr. Miller might have obtained the same results with fewer applications of the thermophore and less discomfort to the patient if he had used a temperature of 150° for one minute in all applications, or even a higher temperature if the area treated was not in the pupillary zone.

Dr. Frank Miller stated that in the first patient he had not thought that it would be possible to save the eye when he first saw the patient, and had been very much amazed at the result from the use of the thermophore.

Thirteenth International Congress

Dr. M. F. Weymann gave a report on the proceedings of the Thirteenth International Congress, at Amsterdam.

M. F. Weymann,
Recorder.

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BLINDNESS IN THE CENSUS

A recent study of the causes of blindness revealed the surprising uncertainty and incompleteness of the best available statistics with regard to such causes. (American Journal of Ophthalmology, 1929, v. 12, page 965.) This year the census will be taken in the United States, and will include an attempt to determine the number of the blind and the causes of their blindness. But, as has been pointed out by Dr. Harry Best, in the most complete book about blindness yet published, and in alluding to the results of a previous census, "these returns do not possess absolute accuracy".

In the statistical analysis of the last census, 1920, it is pointed out that "census enumerators must differ in their standards concerning what persons should be reported as blind. Even experts often have difficulty in determining whether blindness exists in individual cases." As to causes of blindness it is admitted that "the cause reported represents in numerous cases only the patient's diagnosis and not the doctor's". It is hardly to be hoped that census reports will approach absolute accuracy, so long as they represent the impressions individuals have, or wish to give, as to their own defects of vision, the traditions their families and acquaintances have about such people, the statement that some family doctor is supposed to have made about the case, or the conclusion that an enumerator, ignorant concerning blindness, may have come to in the matter.

A good census of blindness will only be possible when each person supposed to be blind is examined by some one who knows what blindness is and what conditions cause it, and who has skill in making the diagnosis of such conditions and in tracing them to their causes. When physicians who have made special study of diseases of the eye, who have had experience in recognizing them, and who have a broad view of their possible origins examine and report on every case of alleged

blindness, we shall have statistics that approach scientific accuracy; but not before then.

To attain such accuracy in the census to be taken this year in the whole United States would be impossible. But accuracy may be approached for limited districts, where the enumerators can report the name and address of every person they learn of who is said to be blind, or who they think may be blind, to a trained eye physician, or to a group of such physicians, or to an institution with such physicians on its staff.

The examination of such cases of supposed blindness would have to be done without compensation, to be credited as part of the large amount of charitable and philanthropic work that the public has come to expect of the medical profession. But it would have a wider significance and greater value than the miscellaneous mass of medical charity that is given in the form of service to individuals.

An attempt of this kind would throw light on the defects in our present statistics of blindness and on the methods for making them more accurate—for minimizing or offsetting our former errors. It would give valuable suggestions for the planning of the next census. Even though merely a very small part of the country were covered by it, the value of such original scientific research would be made evident. The whole profession and the public would learn from it some things they do not yet know about the causes and prevention of blindness. It would be a new movement in cooperation between the government and the medical profession, such as is needed in solving many of the problems of public health.

To special physicians who might take part in such volunteer service for ophthalmology, it would be valuable practice in the development of their own professional methods of examination, knowledge, and judgment. Like other professional experience, it would count in their dealing with every future case. Real skill in a profession is only developed by practice; and such practice as is here suggested, outside the ordinary limits of routine, would have a high educational value.

Any organization, institution, or group of physicians desiring to take up this line of investigation should promptly get in touch with the supervisor of census in their district, to find out what sort of cooperation is possible. Any one who understands the importance of better statistics of blindness can urge the improvement upon the Census Bureau of the Department of Commerce, in a letter addressed to the Director of the Census. It is to be hoped that, where district supervisors are prepared to cooperate, plans to give more certainty and completeness to the census of the blind may be carried out in a few districts differing in populations, industries and manners of living.

Edward Jackson.

THE MANAGEMENT OF SCHOOL MYOPIA

Myopia can hardly be said to be a problem in this country, such as it is in Germany, for instance, and the number of "high myopes" is relatively small. There is a group of cases, however, and quite a large group, as to the practical management of which there is no definitely crystallized opinion. This group is composed of those afflicted with "school myopia".

That there may be no misunderstanding as to what is meant by that term, it may be defined as the type of myopia which appears in previously healthy or slightly hyperopic eyes of children eight to twelve years of age, advances slowly to between four and six diopters, or rarely to eight diopters, and then does not grow any worse.

It is the common practice carefully to correct the refraction of such patients under cycloplegia, to test them again about once a year, and to let them continue their studies with rather casual advice to limit the use of their eyes, especially by artificial light. In some textbooks advice is vaguely given to the effect that it may be necessary to take the child out of school, to give him an outdoor life, and so on.

It seems that formerly this sort of hygienic advice was given more frequently than it is now, when our therapeutic resources have developed, refraction is better done than formerly, and the prejudice against wearing glasses is not so great. But it is a question in some minds whether the plan of relying mainly on the correction of refraction is sufficient.

Certainly the myopia increases in these children in the steady way already mentioned, in spite of constant wearing of glasses. The addition of hygienic measures of a general nature, with limitation of eye work, does not arrest an appreciable number of cases. The age at which the myopia develops and the fact that it appears in children who attend school more often than in the illiterate, would convict use of the eyes for near work of a part in its causation, though we know that a tendency toward myopia as a child grows is in one sense a perfectly physiologic phenomenon. The question which must concern us all is whether we are justified in taking these children out of school and in absolutely forbidding the use of the eyes for two or three years.

Has any one done this in a sufficient number of carefully observed cases to say positively that it will restrict the myopia? It would probably take a collective investigation over a number of years to answer the question, and the observation of a small number of cases over a short period of time is of absolutely no value. The same might be said of the interesting series of cases reported in 1927 by Meyer Wiener, in which the instillation of epinephrin solution seemed to have a favorable effect in arresting this type of myopia.

The questions we should ask ourselves and each other are: Will absolute rest of the eyes from all near work prevent the development of myopia? Can we assure our patients that this result will follow the avoidance of close use of the eyes? Can we assure them that use of the eyes in the usual way will make the myopia increase? How much influence in this phase of the case does the constant use of glasses exert? What has been the effect of sight-saving classes on this condition? Should all such patients be advised to join sight-saving classes where these are available? *E. C. Ellett.*

PRESCRIPTION BY RETINOSCOPY

With regard to many methods of diagnosis it is important to remember that excessive reliance upon their accuracy and finality may lead to error.

In the use of retinoscopy the truth of this statement is far too frequently overlooked, to the disadvantage of the patient as well as of the physician.

The attractiveness of the thought that the physician is entirely responsible for the refractive diagnosis as arrived at by retinoscopy, without that employment of the patient's sensory and mental reactions which is necessary for conclusions at the trial case, is largely responsible for the fact that a great many ophthalmic physicians depend chiefly or even solely upon their retinoscopic findings in deciding what lenses are to be prescribed.

Yet it can be said with absolute confidence and scientific accuracy that, even among those who have devoted the most detailed and skillful attention to the principles and the art of retinoscopy, there is no refractionist whose retinoscopic findings do not frequently require important modification on the basis of the tests conducted by means of the trial case and the visual acuity chart, wherever the latter method of examination is applicable.

The anatomical reason for this lies in the inequalities of refraction as between different parts of the pupillary area, such differences being dependent upon lack of symmetry in the curvature of the cornea or in the structure of the crystalline lens. The periphery may have either a weaker or a stronger refraction than the center, the refraction of the upper half of the pupil may differ appreciably from that of the lower half, or individual quadrants may show special variations.

Many, and perhaps most, refractionists are fully aware of the fact that

there is often a marked difference between the center and the periphery of the pupil, but reliance is usually placed upon the rule that the behavior of the retinoscopic reflex at the center of the pupil is to be studied and accepted in arriving at the measurement desired. Unfortunately the variations in refraction between the different parts of the pupil are not abrupt but gradual, so that it is often impossible to achieve a sufficiently definite selection of the area to be measured, or to avoid being misled by the behavior of the reflex in adjacent parts of the pupil.

The refractive differences between the visual and extravisual zones of the pupillary area, and between the different quadrants of the same eye, have been made the subject of very detailed study by Stine, who corroborates and elaborates the conclusions arrived at by previous writers. (See page 101 of this issue of the American Journal of Ophthalmology.) While positive aberration (less hyperopic or more myopic refraction at the periphery than at the center) is the most frequent, especially in adults, it is important to note that negative aberration and the marked asymmetry of mixed aberration (scissors movement) are met with in forty per cent of children.

It is obvious that reliable retinoscopic estimation of the spherical refraction cannot be made without cycloplegia, and yet the incidental dilatation of the pupil at once introduces the element of a possible influence of the extravisual zone upon the fundus reflex. There is also abundant evidence to the effect that, even when the pupil is unaffected by therapeutic dilatation, nature often employs some mysterious method of selecting a limited area of the pupil for visual purposes. In the retinoscopic examination we have no sure means of deciding exactly what part of the pupil is employed by the brain in cooperation with the sensory organ.

The difficulties created by these inequalities of refraction between the visual and extravisual zones, and also within the visual zone itself, are not obviated by the refinements of cylinder skiascopy recently introduced or developed by Lindner and others. If the axis and especially the strength of the astigmatic error may vary in different parts of the pupil, it is manifestly still necessary to revise the retinoscopic findings by means of tests at the trial case, whenever the patient's age or mental condition renders this possible. As between the examiner who is a poor retinoscopist but an expert with the test lenses and with the various subjective tests for astigmatism, and a worker who is an expert retinoscopist but careless or inexpert with the test lenses and with the subjective tests for astigmatism, the former will achieve results which for the great majority of his patients are far superior to those obtained by the latter.

Herein yet lies the importance of complete familiarity with, and deliberate employment of, the refinements of trial case technique in regard to unilateral and bilateral fogging methods, the astigmatic dials, and the cross cylinder tests for astigmatic axis and strength; the visual acuity aimed at being in every case the maximum of which the individual patient is capable and not an artificial standard of twenty-twentieths or six-sixths.

Too often the trial case test after retinoscopy consists merely of discovering whether with the retinoscopic finding the patient is able to obtain six-sixths vision; while many other workers confine themselves to making a retinoscopic test under cycloplegia and then performing a postcycloplegic test in which they simply determine how much less plus sphere is accepted than was recorded under retinoscopy.

Variations of refraction within the pupillary area of the same eye not only limit the finality of the retinoscopic test, but raise an interesting question as to the relative advantage of prescribing under cycloplegic or postcycloplegic test. If we follow the former practice we may neglect to make due allowance for aberration in the extravisual zone of the pupil: if we adopt the latter method we may fail to give the patient the spherical correction which with per-

sistence he will ultimately more or less readily accept and which will relieve his accommodative spasm (or so-called latent hyperopia). Some favor taking the latter risk, some the former.

Whether the prescription is based upon the examination under cycloplegic or upon the postcycloplegic test, in a fair percentage of cases it is well to advise the patient that subsequent modification may be necessary and that he should report within a few weeks with a view to this contingency.

As to the ultimate accuracy of a prescription for glasses, given an intelligent and cooperative patient, with correct grinding and mechanical adjustment of the lenses, nothing is final except the trial case finding, repeated and revised if necessary in the light of the patient's experience.

W. H. Crisp.

BOOK NOTICES

Diseases of the eye. Sir John Herbert Parsons, F.R.C.S., ophthalmic surgeon, University College Hospital, surgeon Royal London Ophthalmic Hospital, etc. Sixth edition, cloth, octavo, 686 pages, 21 plates, 348 text figures. New York, The Macmillan Company, 1930.

This book has been before the profession for twenty-three years, and retains its popularity on account of its combination of broad scientific outlook and practical common sense, and the choice of topics discussed. What better foundation is there for a life-time study of ophthalmology than its first section of 74 pages with 63 illustrations, taking up clearly anatomy, physiology, elementary and physiologic optics, and the neurology of vision.

The examination of the eye occupies 66 pages, and 306 pages are given to diseases of the eye. Refraction and accommodation are discussed in 27 pages; disorders of motility in 48; ocular manifestations of diseases of the nervous system and other diseases take 22; diseases of the lids, the lacrimal apparatus, and the orbit 56; and preventive ophthalmology 10 pages. There is no chapter on color blindness. What is said about color comes under physiologic optics and symptomatic disturbances of vision. Comparison of this volume with tables of contents of other works will indicate what subjects Parsons thinks are the most important.

But those who have not yet done so will only learn some of its most valuable characteristics by reading this book. The twenty-one pages on the lens show the thoughtful operator, giving careful attention to everything that will influence the doing of the cataract operation—preparation for it, technique, and its practical results. Of the plates all but one are in colors; and nineteen show the clinical appearances of the fundus or of the anterior segment of the eye in disease. This edition shows eighteen added pages and twenty-two new illustrations. The revision has added no lengthy discussions, but a large number of brief additions and modifications. It is a good book for him who takes it as a text book to study, or as a reference book in practice. What there is original in it makes it valuable to those who already possess other standard text books.

Edward Jackson.

Lésions de la macula chez l'enfant et l'adolescent, dites "maladie de Stargardt". (Macular lesions in the infant and adolescent, called Stargardt's disease.) By Henri Tillé, assistant to the Quinze-vingts, Paris. Octavo, paper covers, 112 pages, 9 fundus plates with 2 in color. Norbert Maloine, 27 rue de l'école-de-médecine, Paris, France. 1929. Price not given.

Tillé has produced a very interesting monograph in which he attempts to straighten out the confusion existing in regard to the disease described by Stargardt in 1909 under the name of progressive familial macular degeneration. He concludes that the disease is a separate clinical entity, distinguishable from all similar lesions, and characterized by (1) bilateral macular lesions, (2) onset between the ages of eight and fifteen years, (3) regular and progres-

sive evolution to loss of central vision, and (4) frequent familial character.

The subject is described under eight chapter headings, concluding with a complete bibliography. Of especial interest is the chapter on etiology, in which the views held by different authors are discussed. Certain writers, particularly in Germany and the United States, have described the disease as degenerative and similar to retinitis pigmentosa, while others consider the process to be inflammatory. Morax considers syphilis to be the cause, although in Tillé's personal cases no clinical or serological evidence could be found either in patients or parents. Tillé himself seems to favor the belief that the disease involves a special form of infectious macular lesion of distinct morphology, often heredosyphilitic, which should be treated as such until the contrary is proved. *Phillips Thygeson.*

The blind population of the United States, 1920. Paper, eight volumes, 191 pages. Washington, United States Government Printing Office, 1928.

This is a statistical analysis of the data obtained for the fourteenth decennial census. Government reports are not always the most interesting or even the most valuable kind of literature. But this one, sold by the Superintendent of Documents, United States Government Printing Office, Washington, at thirty cents, is an original source of information that should be of interest to every one working in ophthalmology and with blindness. It was prepared under supervision of Dr. Joseph A. Hill, assistant director, and Leon E. Truesdell, chief statistician of the Bureau of the Census. The text analysis was written by Dr. Harry Best, professor of sociology of the University of Kentucky, and criticism of the proofs was undertaken by Dr. W. H. Wilmer of Johns Hopkins.

This book is based on the reports of the census enumerators, supplemented by reports from institutions for the blind and by a special schedule of inquiry sent to each of the blind and returned by 40,913 of the 52,567 to whom it was sent. The statistics are grouped and analyzed, from various points of view, in 110 tables. Many of these tables, such as those with regard to number and distribution, race and nativity, social and economic conditions, and education, will be of chief interest to sociologists and educators. But those on age when vision was lost, and on causes of blindness, are of great interest to ophthalmologists; and particularly at this time when preparations are being made for the taking, this year, of the fifteenth census, which should yield more complete and reliable data than have yet been obtained with regard to blindness.

A careful study of this work will be of interest to everyone engaged in ophthalmic practice; and it will be worth preserving as a source of original information with regard to blindness.

Edward Jackson.

Egypt, Ministry of the Interior, Department of Public Health, Ophthalmic Section, annual reports 1927 and 1928. Boards, quarto, 40 and 36 pages, illustrated. Price each volume P.T. 10. Cairo, Government Press, 1929.

These two annual reports appear together, bringing the series up to date. They show how completely the work is established that was begun in 1903 by A. F. MacCallan, who went from the Royal London Ophthalmic Hospital to Cairo, supported by the fund of 40,000 pounds given by Sir Ernest Cassel, "to teach the principles of ophthalmic surgery to Egyptian surgeons". After six months of operating in Government general hospitals the first traveling ophthalmic hospital was opened in January, 1904. MacCallan's twenty years of teaching, operating, and organizing ended in 1924. After the world war he was assisted only by Egyptian surgeons, who have succeeded him in the direction and development of this ophthalmic section of the Department of Public Health. (Trans. Ophth. Soc. United Kingdom, 1924, p. 187.)

Under British control traveling hospital units were rapidly multiplied, and then one by one replaced by permanent hospitals. In 1926 the number of units, traveling and permanent, was 31. By June, 1929, the number of ophthalmic units had increased to 44, of which 30 were permanent hospitals and 14 traveling. In 1928 the 27 permanent and 14 traveling units had 381,790 new patients, and did 171,487 operations. But the progress of the Egyptian ophthalmic service has not been simply in numbers treated. There has been a progressive decrease in the proportion of patients that were blind in one or both eyes. In 1909 it was 15.6 and in 1911 it was 19.2 per cent of all patients examined. In 1927 it was 9.8 and in 1928 it was 9.3 per cent. Among those blind from conjunctivitis (trachoma) in 1928, beside 11,596 of total opacity of the cornea and 11,780 of shrunken globe, there were 6,582 cases of secondary glaucoma. The cases of primary glaucoma included 1943 blind in one eye and 1,717 blind in both eyes. We can understand how, before MacCallan left Egypt, the annual expenditure of the ophthalmic units was over $200,000.

But, beside this grappling of modern civilization with the ophthalmias and blindness for which Egypt has been noted for thousands of years, these reports show that the ophthalmic section is doing much for the improvement of ophthalmology in all countries. The report for 1928, which was presented to the Thirteenth International Ophthalmological Congress, contains photographs of twenty permanent and eight traveling hospitals, most of the former beautiful specimens of hospital buildings, while the Giza Memorial Ophthalmic Laboratory, built in 1925, is a home of ophthalmic exactness and research scarcely equalled in English-speaking countries.

These reports also tell how these hospitals will be recognized among the centers for giving courses in ophthalmology leading to the diploma in ophthalmology which is now offered by the Egyptian University. The number of medical officers receiving postgraduate teaching in ophthalmology in 1928 was ten for the course in April, and eighteen for that in October.

In addition to the statistics, each annual report gives a list of interesting cases seen in the hospitals, and the titles of papers read before the annual meeting of the Ophthalmological Society of Egypt. These reports are printed in English and, although they look meager when compared with annual volumes relating to ophthalmology that are issued each year in America and Great Britain, they have real value as original matter bearing on ophthalmology, and deserve a place in society and university medical libraries.

Edward Jackson.

Bulletins et Mémoires de la Société Française d'Ophtalmologie, 1929. Paper bound, octavo, 589 pages. Masson et Cie, 120 Boulevard Saint-Germain, Paris. Price not stated.

This rather massive volume contains the transactions of the 1929 session of the French Society of Ophthalmology held in Paris May thirteenth to sixteenth. The early pages are concerned with the aims and composition of the society, a list of members, and short biographical notices of the following deceased members: Jules Badal, Louis Borsch, Georges Gerard, Lucien Howe, Remy Jocqs, and H. Truc. One hundred and thirty-one pages are devoted to the report of Professor E. Aubaret of Marseilles on the etiology and treatment of the blepharitides. Every aspect of the subject is reviewed carefully and in detail, and the report should be of definite interest to each ophthalmologist. In addition there are forty-seven papers presented at the meeting, with discussions in full. Among these are: "Some indications for tarsorrhaphy", by Van Lint, "Biomicroscopy of the tarsal conjunctiva in trachoma", by Cuénod and Nataf, "On the technique of antiglaucomatous operations" by A. Terson, and "Treatment of late intraocular infections following Elliot's operation"

by Villard and Bouniol. Abstracts of these articles will appear in the abstract section of this Journal. The special report for the 1930 meeting of the society will be on "Biomicroscopy of the crystalline lens in normal and pathologic states", and has been assigned to Duverger and Velter. The report for 1931 will have as its subject "Heredity in ocular affections", and will be presented by Van Duyse of Belgium.

Phillips Thygeson.

CORRESPONDENCE

Laqueur's glaucoma

To the editor:

It was a happy thought of Dr. Jackson to reproduce the Laqueur story for American ophthalmic literature. Outside of the unusually complete and graphic description of his experience as the victim of glaucoma, the story strikes me as notable in three particulars: (1) the allusion to the susceptibility of the Jewish race; (2) the completeness of the case as to the influence of the emotional status; and (3) the deplorable weakness, as per final footnote, in recording the "hearsay" about his colleague.

I recall a statement by Dr. H. Knapp —when I was doing postgraduate work under him, 'way back in the eighties— to the effect that of the recorded glaucoma, probably one-third had been seen in Jewish people.

I do not recall any reference, then, to the rôle of the emotions; but after I had had some experience of my own I called glaucoma, in a medical discussion, a fair analogue of diabetes—origin unknown, mental excitement baneful, and opium briefly palliative. I was so unorthodox in one case, a woman "hypped" by chiropractic, as to suggest a resort to Christian Science; since she would not consider operation. She chose rather to visit friends in California, where she apparently "held her own". But the return to the old and trying environment was disastrous. She died blind.

Burlington, Iowa. *H. B. Young.*

OBITUARY

David Hummel Coover

Dr. David H. Coover, who died in Denver, January 19, 1930, was born in Cumberland County, Pennsylvania, in 1852, and when a small boy moved to Harrisburg. His father was a doctor, and David completed the course in medicine at Jefferson Medical College, Philadelphia, before he was 21 years old, receiving his degree with the class of 1874. He went abroad to study ophthalmology, and was one of the first

graduate class taught in English by Professor Fuchs, in Vienna, after Fuchs's return to that city from Liége. He entered practice in Harrisburg, and became a member of the Pennsylvania State Medical Society in 1876.

In 1890 he removed to Denver, and he continued in ophthalmic practice there until his death. He became a member of the American Medical Association and of the State and County Societies. He was one of the original members of the Colorado Ophthalmological Society, 1899; a member of the American Academy of Ophthalmology and Otolaryngology, 1904; and of the American College of Surgeons.

He became professor of ophthalmology in Gross Medical College; and, after its merger, in the Denver and Gross Medical School; and, after all the Colorado medical schools were combined, he became emeritus professor of ophthalmology in the University of Colorado school of medicine. As a clinical teacher he attracted a bright, active group of assistants, and he built up an excellent clinic.

His contributions to the literature were chiefly clinical, often in the form of case reports. Beside general journals, such as the Journal of the American Medical Association, the New York Medical Journal, and the Philadelphia Medical Journal, he published articles in the Ophthalmic Record, the Annals of Ophthalmology, and the American Journal of Ophthalmology. Those of his papers which attracted most attention described his method of grattage for trachoma, with strips of sand paper. This method did not become widely popular with ophthalmologists; but as done by Dr. Coover it was free from most of the objections that were urged against it, and did less violence to the tissues than other methods of grattage that have been advised by high authorities. Other important subjects he wrote upon were, peritomy in severe episcleritis, detachment of retina treated by scleral puncture, cases of intraocular neoplasm, papilloma of the cornea, high frequency current for amblyopia, cryptophthalmia two cases, and tuberculosis of the conjunctiva.

Dr. Coover was most interested in the practical side of ophthalmology. He was an honorable colleague, and always mindful of the interests of his assistants. *Edward Jackson.*

ERRATUM

On Page 1006 of the December, 1929, issue of this Journal, in the third line from the end of the review of Dr. J. S. Friedenwald's "Pathology of the eye," the word "iritis" should read "arthritis".

ABSTRACT DEPARTMENT

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases, including parasites
18. Hygiene, sociology, education and history

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1. GENERAL METHODS OF DIAGNOSIS

Fortin, M. **Sunlight instrument for observing fundus details.** Ann. d'Ocul., 1929, Sept., v. 166, pp. 728-730.

This is a description with illustration of an instrument for utilizing direct sunlight for observing blood cells and capillaries of the fundus.

Lawrence Post.

Harman, N. B. **An instrument designed to facilitate the taking of fields of vision where there is a central scotoma: the scotograph.** Trans. Ophth. Soc. United Kingdom, 1928, v. 48, p. 241.

The author describes an instrument made in the form of a right-angle tube. The method induces a false fixation spot before the fixing eye, which can be steadily maintained while the non-fixing eye is tested for blind areas. The device is ingenious but appears to the reviewer to have several drawbacks. It would certainly not be so effective as the stereocampimeter so widely used in this country. *A. B. Bruner.*

Manes, A. J. and Malbran, J. **Contribution to the study of the perimeter.** Arch. de Oft. de Buenos Aires, 1929, v. 4, Sept., p. 563.

The principles, technique, and clinical application of perimetry are discussed.

Energetic antisyphilitic treatment is contraindicated in the following conditions:

(1) Diminution of central vision with an early loss of that for colors, the form field being retained normally.

(2) Extreme concentric contraction, with preservation of central vision.

(3) A gradual change in the field, whereby the form field is more affected than that for colors, the central vision being normal. *A. G. Wilde.*

Rivas Cherif, Manuel de. **The present outlook in fundus photography.** Arch de Oft. Hisp.-Amer., 1929, v. 29, Mar., p. 121.

After describing Nordenson's camera as made by Zeiss, the author analyzes the advantages and disadvantages of the apparatus. He considers that much still remains to be done in order to obtain clear images without reflexes and if possible in colors. He exhibits some photographs in which a mistaken diagnosis of choroiditis and retinitis could be made if the observer confined himself to examination of the photographs, without seeing the fundus itself.

M. Uribe Troncoso.

Sreznevsky, V. V. **Sound stimulus as a method of detection of latent anisocoria.** Works of the State Institute of Medical Sciences (Russia), 1929, v. 5, pp. 33-39.

The author calls attention to the anisocoria met with in incipient pulmonary tuberculosis, in pleurisy, in orchitis, and in affections of abdominal and genitourinary organs. Pupillary reactions referred to include the dilatation following mechanical irritation; the sensory reflex brought out by pricking the skin with a pin or by the application of a faradic current to the skin of the forehead or other area, the reflex from painful stimuli, and psychic and emotional reactions resulting from fear and anger.

Analogous to the pupillary reaction to pain is the reaction of the pupil to a sudden sound produced near a patient's ear. Thirteen cases are submitted, including ten patients with pulmonary tuberculosis, one case of Basedow's disease, one case of chronic appendicitis, and one case of aortic aneurism associated with chronic myocarditis, in all of which anisocoria was disclosed by means of sound irritation on the side of the lesion. Latent anisocoria can also be elicited by hyperventilation, by thermic stimulation, and pharmacologically by conjunctival injection of four per cent cocaine solution, adrenalin, euphthalmin, pilocarpin or atropin; or by injection of pilocarpin, atropin, or adrenalin in cases of abdominal affection.

On the basis of his investigations the writer draws the following conclusions: (1) that sound irritation produces pupillary dilatation on the side where an increased excitability of the sympathetic prevails, the latter having an inhibitory action on the pupillary paths of the oculomotor nerve which enables the reflex to appear more distinctly; (2) that the method of sound stimulus should be considered a sensitive means for detection of latent anisocoria in one-sided diseases of internal organs, such as incipient pulmonary tuberculosis, Basedow's disease, and neuroses and psychoses (including hysteria, psychopathic states, and dementia praecox).

Joseph I. Gouterman.

Strohl, André. **Perception of relief and stereoscopic acuity.** Arch. d'Opht., 1929, v. 46, Aug., p. 458.

The primary essential factor in perception of relief is described as binocular vision. Secondary factors of importance are linear perspective, aerial perspective, shadows, the visual angle, accommodation, and relative displacement or parallax. Fifteen seconds is given as about the limit of difference of depth perceptible by trained subjects, while in untrained individuals about thirty seconds is usually the lower limit. Cuts of test cards to be used in the stereoscope for examination of binocular perception of relief accompany the article.

M. F. Weymann.

Wright, R. E. **Hypopyon ulcer of the cornea due to glenospora.** Brit. Jour. Ophth., 1929, v. 13, Oct., p. 496.

An unusual hypopyon ulcer in a Hindu female, aged thirty-eight years, followed an injury by a rice stalk. In the floor of the ulcer was a tough slough. The removed mass was broken up and cultured and later showed mycelium. This was later identified as a fungus belonging to the aleuriosporineæ of the glenospora.

D. F. Harbridge.

Zamenhof, A. **Stereoscopic photography of the fundus.** Ann. d'Ocul., 1929, Sept., v. 166, pp. 689-99.

A brief history of fundus photography is followed by a discussion of the advantages of stereoscopic pictures over those without the stereoscopic element.

A description of the manipulations necessary to obtain these pictures is given. Four illustrative views are included in the article.

Lawrence Post.

2. THERAPEUTICS AND OPERATIONS

Anderson, A. **Injections of milk in ocular lesions.** Med. Jour. Australia, 1929, Nov. 16, p. 725.

Anderson contrasts the attitude in London, where it was implied, "You had better try it, but it won't do much if any good," with that of Vienna, where Pillat said, "If you do not employ milk injections in the treatment of gonoblennorrhea in the adult, of acute iridocyclitis, and of all perforating injuries, you have not done the best for your patient"; and the writer claims that injections of milk had cured 70 per cent of penetrating wounds, in eyes that would otherwise have been lost.

Anderson reports on seventeen cases treated by milk injections. There were two cases of hypopyon ulcer. One had persisted thirty-eight days in spite of vigorous treatment, including cauterizations. Under milk injections there was no staining of the ulcer after nine days, and seven days later the patient was discharged. A boy of seven years gave a history of sore eye for three weeks; and for two weeks the hypopyon persisted in spite of treatment, which included two cauterizations. After a series of milk injections the boy was discharged in fifteen days.

There were two cases of iridocyclitis. One followed needling for traumatic cataract. The pupil had not responded to atropin, and the patient was admitted for a staff opinion on the advisability of removing the eye. Nine days after the first of a series of milk injections, the patient was discharged with a quiet eye. In another case iridocyclitis had recurred after three years; the eye had been irritable for three weeks, and the back of the cornea was thickly dotted with deposits. A week after commencing milk injections pain and injection had disappeared.

Among thirteen cases of perforating injury, the eye had to be removed in four. In the other nine the eye became quiet enough to admit of its being retained with safety to the patient. Of nine cases in which the reaction caused a temperature of 102° F., only one eye was lost. Of eight whose reaction fell short of that, three lost their eyes and five saved them. It was concluded that milk injections were of benefit where hypopyon was present. They should be employed in cases of perforating injury. If they produced a definite reaction greater hope might be entertained of their efficacy than if the reverse were the case.

For such injections fresh cow's milk was boiled for exactly three minutes then cooled in a stream of water and injected at once. The site of injection was the medial side of the upper and outer quadrant of the buttock. The needle had to be inserted straight in, for at least five centimeters in the adult, in children to the bone and then slightly withdrawn.

After insertion there was a pause of thirty seconds to see if any blood entered the syringe. If so, the needle ought to be withdrawn and reinserted. If no blood entered the syringe, the milk was slowly injected, the needle snatched out and the site of injection massaged for several minutes. Four such injections were given. The first two were on consecutive days. A milkless day followed. On the fourth and fifth days injections were given again.

Edward Jackson.

Ask, Fritz. **Ophthalmic risks from respiratory infections and their prevention.** Trans. Oft. Selskab i København, 1928, p. 5.

The author's presentation is the outcome of his experience at the eye clinic of the University of Lund, Sweden. Upper respiratory infections furnish a not inconsiderable risk of infection to patients having undergone ophthalmic operations. The sources may be from other patients, from visitors, from nurses, and also from physicians, especially medical students. The prophylaxis as far as other patients are concerned lies in preventing crowding of the hospitals. It was shown again and again during the war period that infections attained their greatest virulence among soldiers in crowded quarters. The Swedish military hospitals have established 900 cubic feet (9′ by 10′ by 10′) as a minimum spacing for each patient. For nurses and physicians is advised the constant use of gauze masks while on duty. The major part of the

nursing force should not be brought together at one place, as in one dining-room. Such practice increases the chance of spreading infections. Prompt isolation of patients showing signs of colds, etc., should be made. The carrying out of this procedure with the nurses, though highly desirable, offers great practical obstacles. The control of visitors is difficult. Partial success has been obtained by excluding all those who had gross evidences of colds. By observing the above principles marked lessening of infections among eye patients at the hospital was obtained. *D. L. Tilderquist.*

Baldino, S. **Rational fixation forceps.** Ann. d'Ocul., 1929, Oct., v. 166, pp. 824-835.

The author has gone into great detail, using fifteen figures to illustrate the line of stretch from the teeth of various types of forceps when the eyeball is rotated, in discussing the merits and demerits of each type. *Lawrence Post.*

Doumer, E. **Osmotic drainage in ophthalmology.** Arch. d'Opht., 1929, v. 46, Aug., p. 474.

The principles of osmosis are discussed and the theory advanced that by the use of a nonirritating hypertonic solution a beneficial osmotic drainage of the ocular tissues could be secured. Glucose solution is suggested in a concentration of fifteen to twenty per cent. One case of blepharoconjunctivitis in particular responded well to this treatment. *M. F. Weymann.*

Goulden, C., and Finsham, E. F. **The illumination of the field of operation in ophthalmology.** Trans. Ophth. Soc. United Kingdom, 1928, v. 44, pp. 224-240.

The authors describe in detail the various angles of adjustment of an illuminating lamp for different types of operation on the eye. No doubt all of us have learned from experience the advantages of changing the direction of the beam of light according to the operation at hand. The newer operating lamps on adjustable stands have, for most of us, long since succeeded the hand lamp pictured by the authors. Only brief mention is made of the very useful electrical head lamp of the laryngologists, which the reviewer has found very practicable for operations upon both the lacrimal sac and the orbit. *A. B. Bruner.*

Green, A. S. **Ophthalmic delusions.** Calif. and West. Med., 1929, v. 31, Sept., p, 198.

Green classifies as delusions the beliefs that boric acid in a collyrium acts as an antiseptic, that people outgrow strabismus, that one should wait until the age of fourteen years before correcting strabismus surgically, that one should avoid prisms, that trachoma and glaucoma are incurable, and that one should wait until cataracts are mature before operating. As regards strabismus he says: "It will be found that less than ten per cent of the eyes, under complete cycloplegia, become straight. In our own patients we have found that after the age of eight none could be straightened with glasses. Thus ninety per cent of all cases of strabismus should have surgical intervention. This is the method we have followed for twenty years, and our regrets have not been that we have operated too often and too early, but rather that we did not operate earlier than we did". Silver nitrate and carbon dioxide snow are used in the acute cases of trachoma, while tarsectomy is employed on the chronic cases. Elliot's trephining is the method used in operative cases of glaucoma. As for cataract Green remarks that he has thoroughly tried radium and lens extract and has given them up. When vision has fallen below fifty per cent and the patient cannot pursue his ordinary business or social activities, he operates immediately. *Ralph W. Danielson.*

Hilgartner, H. L. **Ocular tuberculosis, diagnosis and treatment with tuberculin.** Texas State Jour. of Med., 1929, v. 25, Sept., p. 360.

This paper comprises an abstract of

some of the recent literature, the technique of administering tuberculin diagnostically and therapeutically, three case reports, and considerable discussion. *Ralph W. Danielson.*

Patton, J. M. **Use of foreign proteins in the treatment of general and ocular inflammations.** Northwest Medicine, 1929, v. 28, Sept., p. 405.

Patton gives a résumé of clinical reports regarding results in many different diseases. Dosage of each drug is considered. In discussing Averett's results in gynecologic infections, the statement is made that a febrile reaction with its train of disagreeable symptoms is not considered essential in the successful use of nonspecific protein therapy. The author has used milk and typhoid vaccine in ophthalmology with good results. The intramuscular dose of boiled milk varies from 2 to 3 c.c. in very young infants to 12 or 15 c.c. in robust young adults, the initial dose of typhoid vaccine for healthy adults is 20,000,000. The treatment is contraindicated in diabetes, alcoholism, pregnancy, and generally lowered resistance. The reaction should be carefully watched. *Ralph W. Danielson.*

Rohrschneider, Wilhelm. **Experimental observations on the changes of normal ocular tissue after röntgen radiation.** Graefe's Arch., 1929, v. 122, p. 383.

The author summarizes in this article the findings of three previous reports on the changes in different ocular tissues of rabbits' eyes after single doses of röntgen rays. It is found that the lens always shows changes in from three to four months after exposure to one epilation dose. The minimal dose that will cause damage to the conjunctiva and to the cornea is somewhat less than this. No immediate effects of röntgen rays on the uvea, retina or optic nerve were found in any of the experiments.

Changes in the conjunctiva consisted in cell changes of the epithelium and, with stronger doses, inflammatory reactions with casting off of the epithelium. The conjunctival sac may become obliterated and complete closure of the palpebral fissure may occur through adhesion of the eyelids to the cornea.

Small doses of röntgen rays were observed to cause retrogressive changes in the corneal epithelium; stronger doses, interstitial corneal inflammation with new formation of vessels, and finally ulceration and perforation.

Röntgen ray injury of the lens consists of subcapsular opacities with vacuoles which are more frequent in the posterior cortical layers. In some cases it advances to total opacity of the lens. *H. D. Lamb.*

Van Lint. **Some indications for tarsorrhaphy; indolent and progressive ulcer of the cornea, traumatic staphyloma of the sclera, contused perforating wounds of the anterior segment.** Arch. d'Opht., 1929, v. 46, July, p. 411.

Tarsorrhaphy is used after intracapsular extraction of cataract, with the result of healing without irritation. In indolent ulcers of the cornea the results are remarkable and, as the lids are united near their center the collyria and ointments may be introduced in the ununited angles. In one case of progressive marginal ulcer all other treatment failed but the ulcer was checked by tarsorrhaphy. In a case of staphyloma of the sclera following a dog bite the staphyloma was cured by tarsorrhaphy, allowing the lids to remain united for four weeks. A staphyloma of the cornea following ulcer disappeared after three weeks. In an irregular perforating wound of the cornea which could not be sutured smooth healing was obtained in four weeks. In a case with traumatic cataract healing occurred in a week. It is recommended to explain to the patient that the eye can be observed and treated through the lateral unsutured portions of the palpebral fissure. *M. F. Weymann.*

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Cowan, Alfred. **The newer forms of ophthalmic lenses.** Arch. of Ophth., 1929, v. 2, Sept., pp. 322-327.

After a short review of the history of lens manufacture, the author discusses a number of widely advertised patented spectacle lenses now on the market. He comes to the conclusion that from a theoretical standpoint, an ophthalmic lens should be free from chromatic aberration, curvature of field, distortion, annoying reflections from the surfaces and astigmatism of oblique pencils, but that no lens made of a single piece of glass can accomplish all these objects. It is known, however, that these errors are not sufficiently marked in ordinary ophthalmic lenses to cause discomfort.

M. H. Post.

Levy, A. H. **Telescopic spectacles.** Brit. Jour. Ophth., 1929, v. 13, Dec., p. 593.

In this communication the author points to the renewed interest in the use of telescopic spectacles This is largely due to the production of a more practical outfit. While the present system has many imperfections, yet because of his own poor acuity the average user is not severely critical. Many patients with very poor vision are deriving benefits which fully compensate for the greater weight.

The Galilean telescope is the form selected, that is to say, a positive objective and a negative eyepiece separated by the difference of their focal lengths. It has the advantage of giving an erect image, thus avoiding the use of an erecting system such as is required with an all-positive telescope. The spectacles are required to have a flat, extensive, tolerably well corrected field, yet at the same time they have to be compact and light in weight. The magnification is roughly fixed: the maximum over-all length allowed is so short that the designer is practically forced to take that minimum. The magnification and the separation of the components fix their focal lengths, and the spectacles have to work with a large field. The designer will therefore have to contend with all the following five aberrations: spherical aberration, coma, astigmatism, Petzval curvature of field, and distortion. Moreover, the spectacles are to be used in ordinary daylight composed of all the colors of the visible spectrum. They ought, therefore, to be as free from chromatic aberration as possible.

These aberrations, which are primary or first order aberrations, are discussed quite fully and are illustrated by drawings. The contribution is well worth examining in the original.

D. F. Harbridge.

Mayer, L. L. **Further visual results with telescopic glasses.** Arch. of Ophth., 129, v. 2, Sept., pp. 315-321.

This is the second paper of the author on the subject of Zeiss "distal" lenses, or telescopic spectacles. The present paper deals with thirty-five additional cases examined in the past two years. The results were almost uniformly good, though in a few no improvement was possible and in a few the glasses were rejected. *M. H. Post.*

Ortin Leoz. **Vascular theory and pathogenesis of myopia.** Arch. de Oft. Hisp.-Amer., 1929, v. 29, Apr., p. 194.

The author considers that ocupational myopia, although not an isolated entity, has an etiological significance. From the clinical standpoint it is undeniable that near work is an important factor in its development. It is not however a basic factor because many people are placed in the same bad conditions of work and notwithstanding this some become myopic while others do not. The author believes that choroidal lesions in myopia are due to arteritis of a more or less sclerosing nature, and probably to a special predisposition of the choroidal vessels since youth. As the changes are almost always located in the posterior segment of the eye, it is probable that the sclerosis attacks especially the short posterior ciliary arteries, each one of which has a special territory and, although not entirely independent, communicates with the others by capillaries and not by larger anastomotic branches. He considers that alcoholism and syphilis, rheumatism, gout, diabetes, tuberculosis,

chemical intoxications, acute intoxications, and especially heredity are predisposing factors which are intensified by diminished vitality. The thinness of the sclera in myopia is probably due to a process of scleromalacia. It is significant that in axial myopia there are usually no changes in the fundus.

M. Uribe Troncoso.

Vontobel, Edward. **Research in the heredity of myopic degeneration of the fundus.** Graefe's Arch., 1929, v. 122, p. 311.

There are tabulated in brief: (1) the ocular findings in five families in each of which members of two generations showed considerable myopic fundus changes irrespective of the amount of the individual's nearsightedness; (2) the ocular findings in five other families in which the fundus changes were slight in relation to the amount of the myopia and to the age; (3) those in three families with individual members having in some cases intense and in others slight fundus changes in relation to the myopia and age; (4) those in three families in which the amount of the fundus changes was moderate in relation to the myopia and age.

H. D. Lamb.

4. OCULAR MOVEMENTS

Ansian, Jose. **Can the obliques be adductors?** Arch. de Oft. Hisp.-Amer., 1929, v. 29, Apr., p. 185.

The author thinks that the oblique muscles of the eye can never act as adductors when they work alone. Ocular movements must be studied when the muscles are associated functionally. The obliques act as adductors when they are associated with the internal rectus and the superior and inferior recti. *M. Uribe Troncoso.*

Ehlers, Holger. **Disturbance of eye muscles in epidemic encephalitis,** Hospitalstidende (Copenhagen), 1929, v. 72, no. 24.

This is a review of the ocular muscle anomalies that appear in this disease, given from a neurologist's viewpoint. Ptosis is probably the most frequent of all the symptoms. To be considered in this regard, the ptosis must be a real defect of motility. The author believes that a center of sleep may exist and that its location is likely to be near the centers of the ocular nerves. Any condition therefore which produces somnolence is also apt to be associated with drooping of the eyelids, which may not be due to a real paresis.

Diplopia is a common symptom; it is extremely variable in its manifestations even in the same patient. The symptom should be studied carefully, for it, too, may be only an association with somnolence or may be due to a myasthenic condition of the eye muscles. The appearance of double vision in the history should be accepted with caution, for patients describe as "double vision" disturbances of vision which are sometimes something else. Complete paralyses occur very rarely. Convergence insufficiency is common. Nystagmus occurs in about 50 per cent of the cases but always in combination with other symptoms. Various spastic conditions occur. Inequality of the pupils is common. An Argyll Robertson pupil occurs sometimes where no suspicion of syphilis exists; a reversed Argyll Robertson may be found, a reaction to light but not to accommodation.

The author emphasizes again that the eye symptoms are extremely variable and that great caution should be exercised in judging their significance.

D. L. Tilderquist.

Ingvar, Sven. **Concerning the representation of certain eye muscles in the oculomotor trunk.** Trans. Oft. Selskab i København, 1928, p. 13.

It has been determined by others that the pupillary oculomotor fibers have their course on the surfaces of the optic formations of the midbrain, optic tract, corpus geniculatum, etc., and that the Argyll Robertson pupil is the result of involvement of these fibers by the basal meningitis so common in syphilis. It has also been determined that the fibers form the levator palpebræ and the superior rectus run on the surface of

the oculomotor trunk and for this reason are easily reached by a basal meningitis, and ptosis results. Now the author with his coworkers has demonstrated that in the macacus the ventral surface of the nerve trunk contains the fibers for the inferior oblique, which is an accessory muscle of elevation. The fibers from the internal rectus and the ciliary ganglion run in the center of the trunk. It has been worked out with some other nerves that the surface fibers are the oldest from a developmental point of view, so it would seem that the original function of the oculomotor nerve was to raise the eyeball upward. All this corresponds with the theory that accommodation and convergence are late acquirements in development.

D. L. Tilderquist.

Knighton, Willis S. **Hereditary nystagmus: report of a case.** Arch. of Ophth., 1929, v. 2, Oct., pp. 437-441.

Nystagmus may be divided into the resilient and pendulum types. The former has a slow component in one direction, immediately followed by a quick return. The slow component is vestibular; the quick, cerebral. This type is due to labyrinthine suppuration, following the Barany tests in normal cases, cerebellar abscess or tumor, tumors of the cerebellopontine angle, Friedreich's ataxia, multiple sclerosis, encephalitis, syringomyelia, Little's disease, and idiocy. The pendulum type is due to faulty retinal image, where fixation has not developed before the onset of amblyopia.

Nettleship expressed the opinion that idiosyncrasy and inherited tendencies played a large part, and that nystagmus in these cases remained latent until excited by some other defect. This hereditary form apparently belongs to neither of the foregoing types. Hereditary nystagmus may be ambisexual, descending through both sexes, though usually through the father, and affecting both sexes, or may descend through the unaffected females, affecting the males only. Moderate degrees of albinism are the rule, though in the ambisexual group normal pigmentation may be present and head shaking may occur.

Trophic or nervous disturbances may be present. Irritability of the horizontal semicircular canals may be diminished or abolished. Consanguinity has been noted in a few cases. The author reports one case which would belong to the male limited type but for the involvement of the patient's mother. The refractive error is very small, but retinitis pigmentosa sine pigmento may be present.

M. H. Post.

Lee, Harry. **A survey of miners' nystagmus.** Trans. Ophth. Soc. United Kingdom, 1928, v. 48, p. 429.

The author presents figures to show the frequency of the condition in various coal mining sections of England and Wales. He then mentions the various theories which have been advanced in the past to explain it. These are (1) postural, (2) deficient illumination, (3) infective, (4) poisonous gases, (5) predisposition or heredity. The author's own theory coincides with that of Snell, in that he believes the nystagmus is essentially a local ocular condition, due to work carried on in deficient illumination, associated with unnatural or constrained position of the eyes. Further, he believes the condition only becomes a disability to the miner when present in an individual whose central nervous system is unstable.

A. B. Bruner.

McCoy, H. J. **Strabismus and amblyopia.** Jour. Iowa State Med. Soc., 1929, v. 19, Nov., p. 485.

McCoy gives the history of the treatment of squint, and discusses the cause of squint under the heads of the muscular theory, the accommodation theory of Donders, the fusion theory of Worth, and the nervous theory of Wilkinson. The methods of treating squint and amblyopia are given. (Discussion.)

Ralph W. Danielson.

Pfingst, A., and Spurling, R. G. **Intracranial aneurisms, their rôle in the**

production of ocular palsies. Arch. of Ophth., 1929, v. 2, Oct., pp. 391-398.

Reviewing various statistics, the authors found that in 5,432 autopsies aneurisms of the basal vessels of the brain were present 44 times, according to Fearnsides' series, Osler found 12 in 800 cases, and Pitt 23 in 900. Positive diagnosis during life appeared impossible.

Recent work by neurological surgeons has somewhat cleared this field. Cushing has found that basal aneurisms are frequent causes for ocular palsies, especially those of sudden onset. Albright found twenty-nine cases in the literature and two in his own experience that were diagnosed clinically. Most neurological surgeons have made this diagnosis and have confirmed it on autopsy or operation. Autopsy has shown that ocular symptoms occur following rupture of the sac in more than one-half of the cases, though pressure symptoms may be present previous to that. When rupture occurs, it is associated with giddiness, stertorous breathing, severe headache, pain in the back of the neck radiating down the back, and paralysis of one or more cranial nerves. The course of the motor nerves of the eye, from their superficial origin at the brain surface until their entrance into the orbit, is such that disturbance of the basal arteries may result in their involvement. Aneurisms at the junction of the internal carotid and middle cerebral arteries result in a rather definite syndrome, consisting of ptosis, mydriasis, downward and outward squint, retarded motility upward and inward, and occasionally complete ophthalmoplegia, usually accompanied by severe pain in the face. Amblyopia or amaurosis is the rule. There are frequently defects in the visual field, congestion of the optic nerve, slight exophthalmos, and when the cavernous sinus is compressed, swelling of the veins of the face. Occasionally, there are disturbances of the sense of smell. Similar signs occur when the aneurism involves the anterior communicating or anterior cerebral vessels. Following rupture, the symptoms, as a rule, subside somewhat. Such attacks recur at intervals varying from several months to a number of years. Apoplectiform seizures occasionally result from a leakage of blood, and, indeed, the attacks may be coordinated with the strata of blood clot found at autopsy. It is probable that recurrent palsies of the third nerve may also fall into this category. Pain in the back of the neck which occurs during leakage from an aneurism is probably the result of an irritative meningitis. The blood is usually found in the spinal fluid, and a positive Kernig sign is frequently noted.

Syphilis is probably responsible for more than one-half of ocular palsies in young people, affecting mostly the optic and oculomotor nerves, due to deposits between the crura and the pons. The attack is more insidious and usually bilateral in syphilitic lesions, and a positive Kernig sign is usually absent. In meningitis of suppurative, tuberculous, or cerebrospinal type, the third and sixth nerves are chiefly involved, and the constitutional symptoms are such as to differentiate the two conditions.

The effect of periosteal or bone tumors at the base or of the hypophysis resembles that of aneurisms before rupture, and the third nerve is especially liable to disturbance in these cases. Abscess or tumor of the brain, and fractures of the base, must also be considered. *M. H. Post.*

5. CONJUNCTIVA

Bruckner, Z. **Permeability of the conjunctiva to tubercle bacilli.** Ann. d'Ocul., 1929, Oct., v. 166, pp. 804-824.

The article contains eleven sections illustrating conjunctival reactions to tubercle bacilli in experimental animals. The conjunctiva is found to be permeable to the organism. This comes about through a chronic conjunctivitis and the carrying in of bacilli ingested by phagocytes. *Lawrence Post.*

Cassimatis, C. **Jequiritol in the treatment of trachoma and its complications of pannus and recurring keratitis.** Jour.

Egyptian Med. Assoc., 1929, v. 12, Oct., pp. 142-148.

Cassimatis is of the opinion that jequiritol, of which the active principle is abrin, is of definite clinical value when properly used and is worthy of being reinstated in the small list of valuable trachoma remedies. Ordinarily the beneficial effects have followed the production of a rather violent ophthalmia, but the author accidentally discovered that nonreactive doses also produced definite healing, especially in recurring ulcerations of the cornea. He believes that a sufficient number of cases have responded to these small doses to prove his contention, and that this innocent and harmless procedure may be of value in other corneoconjunctival affections. *Phillips Thygeson.*

Ismet, Niyazi. **The malignant form of vernal conjunctivitis.** Türk Oftalmoloji Gazetesi, 1929, v. 1, Jan., p. 52.

Ismet describes a case of severe conjunctivitis of ten years' duration, with onset occurring in the spring of the year. There was mild follicular infiltration, with pale milky congestion of the palpebral conjunctiva, and at the limbus there was a nodular formation accentuated internally and externally at the level of the palpebral slit. The bulbar conjunctiva was hypertrophied and the entire cornea densely infiltrated. Vision was limited to hand movements. Numerous eosinophiles were found in the conjunctival secretion and a slight eosinophilia in the blood. In order to verify the diagnosis of vernal conjunctivitis a section of the limbal conjunctiva was removed and examined microscopically. Lesions characteristic of the disease were found.

Phillips Thygeson.

Levinson, Malka. **Contribution to the epidemiology of inclusion conjunctivitis in Switzerland.** Schweiz. med. Woch., 1929, v. 59, July 27, p. 765.

A study of all trachoma cases treated at the University of Basel eye clinic for the 1923 to 1928 period showed fourteen out of fifty-one cases originating in Switzerland, the rest being traced to eastern Europe and the neighboring German, French, and Italian provinces. Inclusion bodies were found in trachoma as well as in swimming-pool conjunctivitis, nongonococcal ophthalmia neonatorum, and catarrhal ophthalmia. The May-Gruenwald-Giemsa method was found simpler than Lindner's method for staining the Halberstaedter-Prowazek bodies. In differential diagnosis the author was guided by the principles laid down by Kuhnt, namely that trachoma is characterized by softness and varying size of follicles, lividity of conjunctiva due to infiltration of the deeper subconjunctival layers, follicles on the plica semilunaris and the bulbar conjunctiva, pannus, conjunctival scarring, and thickening and deformation of the upper tarsus. Acute onset and persistent monocular involvement were observed. In only one case was specific urethritis found to coexist. Cases were regarded as infectious when the slightest conjunctival infiltration was noted, even in the absence of inclusion bodies. On the basis of a correlative study of gonococcal and nongonococcal ophthalmia neonatorum, the epidemiologial relationship of nontrachomatous conjunctivitis exhibiting inclusion bodies and of nongonococcal ophthalmia neonatorum and blennorrhea, which also showed inclusion bodies uniformly, is suggested.

M. Davidson.

Orloff, K. C. **The bacteriology of the conjunctiva in trachoma.** Archiv Oftalmologii (Russian), 1929, v. 6, pts. 2-3, pp. 146-152.

The author isolated from the conjunctiva, in trachoma, a microorganism which he calls "corynebacterium ramificans". The colonies of this bacterium, grown on Noguchi's blood-agar medium, are circular and of grayish color; on the fifth day they develop a central bulging. Microscopically the "corynebacterium ramificans" is a gram-positive bacillus of varying length, usually branching and with thickened ends. When introduced into the cornea and into the anterior chamber of a rabbit, this bacterium caused corneal ulcera-

tion and purulent iritis respectively. The rôle of the "corynebacterium ramificans" in the pathology of the human eye is not yet established.

M. N. Beigelman.

Riggins, I. W. **The use of radium in the treatment of vernal conjunctivitis.** Radiological Rev., 1929, v. 51, Sept., p. 451. (From Arch. Physical Therapy, X-ray, and Radium, 1929, v. 10, Apr., pp. 174-176).

Four reports are given of cases in which excellent results were obtained with the use of radium. The average dose is 10 to 25 mg. to each lid for about ten minutes. One to three treatments sufficed. Riggins states that a soft, atrophied, flexible scar replaces the excessive epithelial tissue which makes up the condition. He advises low dosage and the use of a thin screen. In discussion, Clark also warned against overdosage. *Ralph W. Danielson.*

Salvati. **The treatment of trachoma and its complications by tracolysin.** Jour. Egyptian Med. Assoc., 1929, v. 12, Oct., pp. 155-158.

Salvati deplores the use of destructive chemical and mechanical agents in the treatment of trachoma, and claims that the resultant cicatrization injures the cornea, causing alteration of the epithelium and consequent vascularization. He states that tracolysin, which was introduced by Angelucci, is the best remedy in trachoma, and that, when injected into the conjunctival cul-de-sac in a dose of 0.50 c.c. each time up to a maximum of thirty injections, it produces resorption of the trachomatous follicles and above all a rapid disappearance of corneal complications.

Phillips Thygeson.

6. CORNEA AND SCLERA

Cassimatis, C. **Jequiritol in the treatment of trachoma and its complications of pannus and recurring keratitis.** Jour. Egyptian Med. Assoc., 1929, v. 12, Oct., pp. 142-148. (See Section 5, Conjunctiva.)

Constans, G. M. **Blue sclera and brittle bones.** Journal-Lancet, 1929, v. 49, Nov. 15, p. 507. Constans gives a short review of the literature on this syndrome, which consists of blue scleras, fragility of the bones, otosclerosis, and a definite familial history of these inherited characteristics passing from affected individual to affected individual. Two cases are reported with Mendelian diagrams of the heredity. (Bibliography.) *Ralph W. Danielson.*

Espildora Luque. **A case of reticular formation in the anterior chamber.** Arch. de Oft. Hisp.-Amer., 1929, v. 29, Jan., p. 1.

This case shows the great advantage of systematic examination of diseases of the anterior segment of the eye with the biomicroscope. Better results do not depend only on the larger magnification but on the stereoscopic view that the optical section of the cornea and of the transparent media affords.

The patient was a woman forty-five years old who complained of impairment of vision in the left eye. With oblique illumination the cornea showed an irregular granular surface, with interstitial opacities and some white striæ, possibly in the stroma near the center of the cornea. The lines had a network appearance and the contour had a rounded shape. The iris could be seen only with great difficulty through the cornea. The pupil reacted well and dilated fully with atropin. In the right eye the condition was similar but less advanced, and permitted a better examination. A diagnosis was made of old bilateral interstitial keratitis, and the white striæ were interpreted as ruptures in Descemet's membrane or as tracts of sclerosis, similar to those observed in some cases of buphtalmos, keratoconus, and cataract. The examination of the right eye with the biomicroscope showed, however, how much mistaken the last assumption was. The white striæ were in reality a circular network of white-gray transparent glassy filaments, situated in the anterior chamber and not in the cornea, and in contact with Descemet's membrane only by fingerlike projections in the periphery. In the upper part the

filaments had an oblique course, forming a coarse meshwork, but in the lower part they had a rounded shape and were separated from the posterior surface of the cornea, to which they were only attached by two or three prolongations. Each filament had in the axis a line of darker color. In the cornea itself there were remnants of an old interstitial keratitis with many obliterated vessels. The iris and lens were normal. The fundus of the right eye, which alone could be examined, was normal.

Going over the literature the author found a similar case described in the Annales d'Oculistique for February, 1926, by Weill and Jost, in which the transparent threads did not reach the limbus and were parallel to the cornea. Their structure, as in Luque's case, was not homogeneous, but the authors believed this to be only an optical illusion, as they could observe the same appearance in fine threads of glass seen with the same magnification. Vogt has also described this network formation in the anterior chamber as a later sequel of parenchymatous keratitis. The threads in his case had deposits of pigment which also appeared in Descemet's membrane. However, the first to describe this condition was Stähli, but in his cases the striæ were in contact with the cornea throughout. The vitreous network seems to be permanent, as a new examination of Luque's patient two years later did not show any change.

Regarding the pathogenesis of this condition. Weill and Jost believe that the threads are due to folds of the corneal endothelium without any involvement of Descemet's membrane. Later on the two inner surfaces secrete a vitreous substance similar to the one observed in the elastic lamina after ruptures in Descemet's membrane in buphtalmic eyes, and the filaments detach themselves in the center, remaining attached to the periphery of the cornea.

M. Uribe Troncoso.

Martinez Nevot. **Ultraviolet light in the treatment of phlyctenular keratoconjunctivitis.** Arch. de Oft. Hisp.-Amer., 1929, v. 29, Aug., p. 470.

In twenty cases of phlyctenular keratitis ultraviolet rays were applied on the body in sessions of from two to three minutes, increasing gradually to twenty minutes. The eyes were protected by special glasses. Both in the benign type of the disease and in severe keratitis the disappearance of the symptoms was more rapid than usually. The best effects of the ultraviolet rays, however, were seen in cases of scrofulous pannus. The treatment was harmless and relapses were not frequent.

M. Uribe Troncoso.

Salvati. **The treatment of trachoma and its complications by tracolysin.** Jour. Egyptian Med. Assoc., 1929, v. 12, Oct., pp. 155-158. (See section 5, Conjunctiva.)

Williamson-Noble, F. A. **An unusual case of corneal disease.** Brit. Jour. Ophth., 1929, v. 13, Nov., p. 572.

This is the case record of an unusual corneal lesion followed by marked increase of hyperopia. In October, 1924, a female aged forty-four years accepted + 1.50 + 1.00 axis 180°, V. = 6/6. In April, 1927, she complained of misty vision. No abnormalty was present, the refraction was unaltered. November of the same year she complained of seeing a spider's web round lights; vision = 6/18. In December the slit-lamp showed a slight opacity occupying the pupillary area in the posterior third of the cornea. There was no evidence of inflammation. Vision = 6/60—. The possibility of the dystrophic process affecting the fellow eye inspired the theory that the underlying condition might be endocrine, deficiency disease, or a defect in calcium metabolism. The patient was given thyroid, parathyroid, codliver oil, and sunlight. March, 1928, the fellow eye remained clear; sight in the affected eye seemed better to the patient but vision remained 6/60. In April the posterior corneal disc opacity was about the size of the undilated pupil. In June there was a star-shaped pigmented area in the anterior corneal layers. Vision = 6/60. Before doing a contemplated iridectomy a thorough

refraction was done. To the great surprise of the writer + 9.00 + 1.00 axis 60° gave vision of 6/12. Flattening of the cornea had produced the increased refraction. (One photomicrograph.)

D. F. Harbridge.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Gifford, S. R. **Modern views of sympathetic ophthalmia.** Nebraska State Med. Jour., 1929, v. 14, Nov., p. 432.

Gifford outlines the theories of the etiology of sympathetic ophthalmia and refers the reader to the monographs by Peters and H. Gifford. The author is to report soon some results of experiments of his own. As early diagnostic signs he mentions reduction of vision with or without congestion or pain, increasing myopia from ciliary spasm, optic neuritis and cells in the anterior chamber. Cataract and glaucoma may occur as late complications. In addition to the well-known chronicity one may have recurrences.

In the prophylaxis, enucleation of a hopelessly injured eye is advisable, but Gifford suggests that in a fresh injury, before sympathetic inflammation has begun, especially in young persons, the risk is so slight that simple evisceration is justified for the sake of the better stump obtained. When an attempt to keep the eye has been decided upon, the author believes that the most important measure is prompt covering of any wound containing prolapsed uveal tissue with a sliding conjunctival flap, guarding against loss of vitreous by akinesia, and placing sutures before excising the prolapse.

The blood count, skin tests, and complement fixation tests are believed unreliable. Upon definite evidence of inflammation in the second eye, the sympathogenic eye is removed if it is blind or nearly so. In addition the author administers large doses of sodium salicylate or cincophen, foreign protein, and mercury inunctions, and also removes any foci of infection. The salicylates should be stopped for twenty-four hours after the foreign protein injection. Out of twenty-seven cases treated, the records show eighteen with good vision, while nine were nearly blind. Gifford concludes that the disease does not present such a gloomy prognosis as was once thought.

Ralph W. Danielson.

Soriano, F. J. **Deafness, alopecia, and gray hair in severe bilateral iridocyclitis.** Arch. de Oft. de Buenos Aires. 1929, v. 4, Sept., p. 537.

There is a current opinion that sympathetic ophthalmia is accompanied frequently by deafness, baldness, and grayness, the last two being especially liable to affect the cilia. As these appear too frequently to be merely coincident, various theories have arisen to explain their origin.

The studies of Komoto, Cramer, and Peters are reviewed.

The cases of sympathetic ophthalmia seen by the author occurred especially between the ages of thirty and forty years, and were preceded by a period of well marked headache. The first eye symptom was bilateral diminution of vision due to neuroretinitis and diffuse choroiditis, wth blurring of the pupillary margins and grayish clouding of the entire fundus. The process progressed from behind forward, as a severe iridocyclitis with abundant precipitates. Later occurred detachment of the retina, hypotonia, and deepening of the anterior chamber.

Should the inflammatory process ever lessen, the media clear and the fundus is seen to be diffusely pigmented. The first complication is disturbance of hearing, with tinnitus, and at times a springlike nystagmus. These symptoms increase in proportion to the eye disturbance.

Changes in the hair are seen two or three months after the eye involvement. There may be coincident pigment changes in the normal skin that may progress to the stage of vitiligo. By way of treatment the author recommends enucleation of the irritating eye at once, with foreign protein injections and intensive administration of salvarsan and mercury. *A. G. Wilde.*

8. GLAUCOMA AND OCULAR TENSION

Aynsley, T. R. **Buphthalmos and nevus.** Brit. Jour. Ophth., 1929, v. 13, Dec., p. 612.

The author reports four cases of this condition, two of his own and two from the Fountain Hospital. All were in young female imbecile children; the facial nevus being extensive. X-ray pictures of the skull showed frank calcified meningeal nevus and a suspicion of commencing calcification. The presence of glaucoma and its association with facial nevus are discussed as to whether the conditions are causally or accidentally related. The writer expresses the opinion that facial nevus has in itself no causal relationship with glaucoma, but that where the general cause of facial and bodily nevi, either a toxin or slight trauma to the branchial clefts, acts to produce nevi of the cerebral vessels, then the mesoblastic structures of the developing eye may be affected. All cases should be examined by x-rays for possible intracranial lesions. (Six illustrations, twelve references, and a table of thirteen reported cases accompany the contribution.)

D. F. Harbridge.

Daily, R. K., and Daily, L. **The use of glaucosan, with report of cases.** Texas State Jour. of Med., 1929, v. 25, Aug., p. 292.

This paper is a digest of the literature regarding the two kinds of glaucosan. The results of other workers, the rationale, and the technique of its use are given. Seven case reports are followed by the following conclusions: Glaucosan is a valuable addition to the armamentarium of the oculist. Amino-glaucosan is effective in some cases of acute glaucoma. Levoglaucosan is the most valuable drug we have in cases of iritis with hypertension. It will reduce the tension in chronic simple glaucoma, and has a place in glaucoma therapy for temporary and preoperative purposes. *Ralph W. Danielson.*

Espildora Luque, C. **The age and sex of glaucomatous patients.** Arch. de Oft. Hisp.-Amer., 1929, v. 29, June, p. 317.

The author has studied 300 glaucomatous patients from the clinic of El Salvador, in Chile, and although in that country the average span of life is shorter than in Europe or the United States, the statistics data will only be deficient in regard to advanced age. The age at which glaucoma appeared varied from 15 to 120 years of age. It is a common belief that glaucoma is a disease of old age, but the author found twenty-five cases starting at from fifteen to forty years of age. The curve then rises abruptly and continues rising until sixty years, stays at the same level until seventy, and goes down markedly from seventy to 120 years of age.

In regard to sex the author found glaucoma much more common in women (207 of the 300 cases) except from 70 to 80 years of age, when the proportion of men is higher. In men the disease is less frequent before the age of sixty-one years, but then almost doubles after that. The greatest frequency in comparatively young women could probably be ascribed to sexual disturbances, although ovarian function is probably not a factor. Acute glaucoma is much more frequent in women than in men. Of 59 acute cases tabulated 49 were in women and only 10 in men. In chronic glaucoma the same relation holds true: of 241 cases, 159 were in women and 82 in men.

M. Uribe Troncoso.

Espildora Luque, C. **Systematic examination of 300 cases of glaucoma in young, adult, and old people.** Arch. de Oft. Hisp.-Amer., 1929, v. 29, July, p. 381.

In this second article the author studies his series of 300 cases from the systemic standpoint. Of twenty-five cases which were less than forty years old, fifteen had confirmed syphilis and four a doubtful infection. The clinical symptoms were aortitis, valvular insufficiency, and hypertension. In two cases the syphilis was hereditary.

Of the six glaucomatous patients

who did not have syphilis, two developed acute glaucoma after a severe attack of influenza, one suffered from chronic myocarditis with symptoms of cardiac decompensation, and the other three had no general pathologial condition.

The author emphasizes that he does not try to establish a relationship of cause and effect between syphilis and glaucoma, but simply points to their frequent coincidence.

In the group of 161 adult patients, between forty-one and sixty years of age, Luque found that syphilis was as frequent as in the young patients, and that arteriosclerotic changes began to appear. Syphilis was found in seventy-seven cases or forty-eight per cent; that is, about half of the cases; a percentage which is inferior to that already mentioned for young glaucomatous patients (sixty per cent). In ten cases in which syphilis had been ignored and was only discovered after the Wassermann test, the systemic changes were aortitis, with or without valvular lesions, and arterial hypertension. In eighteen patients, although the Wassermann was negative, syphilis was diagnosed because they had involvement of the aorta.

Arteriosclerosis was found in thirty-five glaucomatous patients, or 22.7 per cent. Some of them had arteriosclerotic changes and others hypertension. In a few aortitis was disclosed by x-ray examination. In the more advanced group, beside aortitis and hypertension there were symptoms of renal sclerosis. In eighteen patients there was no general condition.

In the group of 114 patients more than sixty years old, vascular sclerosis was in the foreground, fifty-four per cent suffering from this disease. On the contrary syphilis was much less prevalent (twenty-seven cases). Arterial hypertension without any other symptom was present in seventeen patients. In six cases no general condition was discovered. *M. Uribe Troncoso.*

Espildora Luque, C. **Vascular changes in glaucomatous patients.** Arch. de Oft. Hisp.-Amer., 1929, v. 29, Aug., p. 453.

In this third article Luque emphasizes the importance of vascular changes in relation to glaucoma. They were present in the 300 patients as follows: in young people 68 per cent; in adults 78 per cent; in senile patients, 88 per cent. This shows that in much more than one-half of the cases in all epochs of life, vascular sclerosis occurred; its percentage increasing with age.

In young glaucomatous cases vascular changes and syphilis were almost alike in frequency, 68 per cent for the former and 60 per cent for the latter. This is thought to mean that glaucoma in young people is not caused by the syphilis itself, but by the vascular changes which it produces. In adult patients chronic aortitis is the most frequent vascular change, even more so than hypertension. It is a very characteristic symptom, just as it is in tabes, and sometimes gives a clue to the diagnosis. Aortitis was found in 62 per cent of the patients; hypertension only in 52 per cent. Aortitis appeared in 44 per cent of cases in young people; in 63 per cent of the adult cases; and in 63 per cent in senile advanced stages.

In regard to arterial hypertension, according to the author's statistics it appears in young people in 32 per cent of the cases; in adults in 55 per cent; and in senile cases in 71 per cent. It is exceptionally found alone, being generally associated with aortitis and arteriosclerosis and most rarely with nephritis. In regard to the kind of glaucoma, arterial hypertension occurs in 62 per cent of the cases of acute and 57 per cent of the chronic types. When it is not found in the brachial or radial arteries it is usually present in the tibial. On the other hand a diminished blood pressure was found in five patients, three young and two adult.

Nephritis was detected in only 10 per cent of the glaucomatous patients.

M. Uribe Troncoso.

Ismet, Niyazi. **Microscopic examination of an eye seven years after trephine**

operation. Türk Oftalmoloji Gazetesi, 1929, v. 1, Jan., p. 43.

Ismet reports the anatomo-pathologic examination of an eye trephined by him seven years previously and enucleated because of infection. Before enucleation no lesion of the conjunctival epithelium covering the trephine opening could be discovered either with the loupe or the corneal microscope, and there was no staining with methylene blue. In the microscopical specimen, however, the conjunctiva was seen to be atrophic and the epithelium was destroyed at one point. The trephine opening was obstructed with inflammatory débris, but there was no proliferation of the corneal and scleral fibers surrounding it. *Phillips Thygeson.*

Kemal, M. **Glaucoma following a plastic operation on the lower lid.** Türk Oftalmoloji Gazetesi, 1929, v. 1, April, p. 124.

Kemal's patient was operated upon for tumor of the lower lid, the lid with conjunctiva being removed and a repair made using a skin flap from the face. Beginning the third day the patient complained of violent pains in the eye and head. On examination the cornea was found to be steamy and the pupil dilated. The tension was 65 mm. Schiøtz. Under miotics and after simplification of the dressing the tension returned to 29 mm. on the sixth day. For lack of other cause the author attributes the glaucoma to the compression and rubbing of the bulbar conjunctiva by the tight bandage. He cites Lagrange as reporting two similar cases. *Phillips Thygeson.*

Menacho, M. **Basis for treatment of ocular hypertony.** Arch. de Oft. Hisp.-Amer., v. 29, Mar., 1929, p. 131.

This is an elaborate article on the treatment of glaucoma, whose pathogenesis and lesions are described. When hypertension is acute or subacute, without any anatomical changes, iridectomy is the method of choice, but in chronic cases the best operations are those which establish communication between the intraocular circulation and the subconjunctival space.

The author stresses the importance of doing a "preventive iridectomy" in those eyes which are in great danger of glaucoma, especially those in which the other eye has clear symptoms of hypertension or is already in an advanced stage of glaucoma.

M. Uribe Troncoso.

Noiszewski, K. **Relation between cerebrospinal and intraocular pressure.** Arch. d'Opht., 1929, v. 46, Aug., p. 492.

In support of his view that glaucoma and glaucomatous changes in the nerve head are due to diminished intracranial pressure, the writer submits photographs of the disc of a normal dog and of a dog which has had a craniotomy. In the operated dog the intracranial pressure was kept subnormal for two months and the papilla showed changes similar to those seen in glaucoma.

M. F. Weymann.

Ungever, F. **Treatment of glaucoma with adrenalin.** Ann. d'Ocul., 1929, Oct., v. 166, pp. 764-804.

The author reviews the use of adrenalin in glaucoma and cites seven cases of his own. His conclusions comprise fourteen points, the most important being that adrenalin is of most value when used in conjunction with the miotics and especially in chronic simple glaucoma. The early action of adrenalin he attributes to vasoconstriction, the later to a secondary paralysis of the intraocular vessels and a reaction of hyperemia. *Lawrence Post.*

9. CRYSTALLINE LENS

Boiler, W. F. **Congenital cataracts and amblyopia.** Jour. Iowa State Med. Soc., 1929, v. 19, Nov., p. 491.

Boiler presents a digest of the literature on the subject, and concludes that a congenital cataract which obstructs the vision should be operated upon early, and correcting lenses applied as soon as possible, followed by training of the vision. (References. Discussion.) *Ralph W. Danielson.*

Castroviejo, Ramon. **Histology and pathology of the zonula—their clinical significance in the cataract operation.** Illinois Med. Jour., 1929, v. 56, Oct., p. 261.

A résumé of the views of different men regarding the origins and insertions of the zonular fibers is followed by directions as to how one may dissect an eyeball in order better to understand the anatomy. It is stated that the fibers become more fragile with age, especially in diseased eyes. The author concludes that if the zonular fibers are attached to the retina, and the intracapsular operation for removal of cataract be performed after the age of fifty-five years, this can be done without danger, because of the loss of resistance and the extreme fragility of the zonular fibers at that age. But in younger individuals, in whom the resistance and elasticity of the zonular fibers is high and the fragility low, detachment of the retina and iridocyclitis might follow. *Ralph W. Danielson.*

Fisher, W. A. **Senile cataract, simplified phacoerisis.** Illinois Med. Jour., 1929, v. 56, Sept., p. 180.

Fisher gives his preoperative routine, technique of operation, and after treatment in detail. The main points in the technique are akinesia, sutures in the lids, in the superior rectus muscle, and in the conjunctival flap, and removal of the lens with the erisiphake top side first. Patients are allowed up and the unoperated eye left free on the second day. Autohemotherapy is used for complications. Phacoerisis as practiced by the author and by Barraquer are compared. *Ralph W. Danielson.*

King, Clarence. **Some procedures and instruments of practical value in cataract extraction.** Ohio State Med. Jour., 1929, v. 25, Sept., p. 713.

King gives an account of his favorable personal experience and his technique in the use of the Mellinger and Blascovics specula, the Desmarres lid elevator, bridle suture through the superior rectus: Elschnig's fixation forceps, and Elschnig's anterior chamber forceps. The author believes that Ascher's method of paralyzing the superior rectus muscle also in akinesia should be practical. For the incision he has changed over from wrist motion to hand and finger control. Lens spoons of Elschnig are used instead of irrigation. *Ralph W. Danielson.*

Protopopov, B. V. **Iontophoresis in the treatment of cataract.** Archiv Ophtalmologii (Russian), 1929, v. 6, pts. 2-3, pp. 378-389.

The author used Wirtz's technique of iontophoresis with a one percent solution of sodium iodide, in twenty-four cases of senile and in four cases of complicated cataract. The results were controlled by periodic testing of visual acuity and examinations with the slit-lamp. In none of these cases was any visual improvement noticed. In six cases (two immature and four complicated cataracts) the lenticular opacities progressed notwithstanding the iontophoresis. In the incipient cataracts no change was noticed during one year of observation. *M. N. Beigelman.*

Trantas. **Senile lesions of the anterior lens capsule and pupillary border.** Arch. d'Opht., 1929, v. 46, Aug., p. 482.

Thirty-six cases out of two hundred and thirty-seven individuals between the ages of fifty-five and eighty years showed lesions of the anterior lens capsule of a type described by Vogt. The syndrome consists of slight opacity of the lens capsule covered by the iris, and there may be a discoid opacity of less degree occupying the pupillary area. There may be also a gray flake-like accumulation on the pupillary border of the iris. Seventy-five percent of Vogt's cases had chronic glaucoma, whereas only thirty-three per cent of the writer's were so afflicted. Other senile changes in the eye and lens were also present, so that he believes that the capsular lesions are only an expression of senile degenerative change and are much more frequent than has previously been thought. *M. F. Weymann.*

Vogt, A. **The genesis of "sunflower" cataract.** Schweiz. med. Woch., 1929, v. 59, June 22, p. 657.

The evolution of an eye with a copper particle in the vitreous was observed in a boy of twelve years. The lens was still free from cataract three months after the injury, but the slit-lamp showed the greenish-gray dotting of the lens, previously described by Vogt as the precursor of "sunflower" cataract. During the following three months the dots were observed to thicken to arrange themselves in the form of a ring, and to assume the typical "sunflower" appearance. Iridescence did not appear throughout the period of observation. Careful study of the dots showed them to be located directly under the anterior capsule. Vogt considers iridescence and sunflower cataract to be independent phenomena. In the vitreous a very fine greenish-gray dust, with particles of the size of leucocytes, was noted. The anterior capsule in the grasp of the forceps, in the cataract extraction done as a preliminary to removal of the foreign body through the pupil, was examined microscopically. Nothing was noted until an H_2S solution was added. This revealed very fine black dots massed around the nuclei of the capsular epithelium. No dots were demonstrated in the capsule itself or in the lens fibers. Impregnation of the capsule epithelium with a copper compound is held by Vogt to be responsible for the formation of "sunflower" cataract, characteristic of the intraocular presence of copper.

M. Davidson.

10. RETINA AND VITREOUS

Blanco, Tomas. **Colmatage at the limbus.** Arch. de Oft. Hisp.-Amer., 1929, v. 29, Jan., p. 14.

Blanco has used the method of Lagrange, cauterizing the limbus after section of the conjunctiva, with the purpose of increasing the intraocular tension in cases of detachment of the retina. He claims that a reattachment can be obtained in about twenty-five percent of the cases, with varying results in regard to acuity of vision and to the visual field. The colmatage must be done gradually in two or three sessions and at the earliest possible stage of the disease. *M. Uribe Troncoso.*

Coverdale, H. V. **The cause and results of obstruction of the central artery of the retina: a study of eleven cases.** Brit. Jour. Ophth., 1929, v. 13, p. 529.

The basis for this thesis is eleven cases treated at Moorfields hospital from February to September, 1928. Embolism, endarteritis, thrombosis, and more recently spasm of the arterial wall, separately or in combination, are the processes responsible in acute obstruction. Endarteritis with thrombosis is usually considered to be the cause in cases occurring late in life.

The essayist considers the history and general condition of the patient, the changes observed in the eye, and their effect on the nutrition and the function of the retina. Recorded observations and opinions are referred to.

The retinal circulation is discussed under the subheadings of the caliber of the arteries, and pulsation and beading of the blood column. The appearances of the obstruction, the cause of retained circulation, spasm of the artery, changes in the retina and especially in the macular region, and fields are each separately discussed. Many field charts, illustrations, and eleven case reports accompany this excellent contribution, which should be read in the original by those interested. (Bibliography.)

D. F. Harbridge.

Dejean, Paul. **Notes upon the form and structure of the vitreous body as seen with the slit-lamp.** Arch. d'Opht., 1929, v. 46, Aug., p. 477.

The vitreous body appeared as transparent portions enclosed or separated from each other by a series of opalescent sheets having in general a vertical direction. The writer does not find fibrils but thinks that these sheets may appear as fibrils under certain conditions of illumination, just as a pane of glass may appear as an opaque line if

it is seen edge toward one. The fibrils as described by histologists may be cross sections of the hyalin sheets making up the structure of the vitreous. It is advised not to excise prolapsing vitreous with the scissors, because this opens these hyalin envelopes and allows greater loss than if the wound is allowed to close untouched.

M. F. Weymann.

Mann, Ida C. **A case of congenital abnormality of the retina.** Trans. Ophth. Soc. United Kingdom, 1928, v. 48. p. 383.

This rare congenital anomaly is probably due to abnormal closure of the fetal fissure, associated with a large congenital detachment of the retina. The ophthalmoscopic appearance was that of a large detachment in the lower portion of the fundus, and on the detachment a raised ridge of whitish color. This ridge commenced at the lower border of the disc and ran downward and forward, giving the appearance of a core-shaped mass made up of organized tissue and blood vessels.

A. B. Bruner.

Mann, Ida, and Ross, J. A. **A case of atypical coloboma associated with abnormal retinal vessels.** Brit. Jour. Ophth., 1929, v. 13, Dec., p. 608.

In a former contribution, Mann grouped into three classes the anomalies of the macular region: (1) pigmented macular coloboma, (2) nonpigmented macular coloboma, (3) macular coloboma associated with abnormality of blood vessels.

The case report presented falls under the last classification. A man aged fifty-nine years presented a disc in which the superior temporal vessels were represented by a single threadlike vein. Up and out from the disc was a pearly-white cup. The margin overhung, except the lower nasal portion which shelved. The cup was deep, and from it emerged large vessels which supplied the upper temporal quadrant of the fundus. This was the unique feature in the case. The threadlike superior temporal vein anastomosed at two points at the nasal border of the cup with the choroidal vessels, which were easily seen. Continuous with the normal blind spot was a scotoma corresponding with the coloboma.

The freedom of the rest of the eye from any abnormality, and the clear-cut nature of the defect, seem to the authors to point to a single localized lesion developing at a definite time rather than to any inherent failure in organogeny. It is their belief that the explanation can be found in a localized patch of choroidal disturbance occurring during the fourth month, and that the case falls into the class of atypical colobomata associated with abnormal vessels. (Two illustrations.)

D. F. Harbridge.

Mayou, M. S. **Coats's disease, juvenile form.** Trans. Ophth. Soc. United Kingdom, 1928, v. 48, p. 150.

The paper first enumerates Coats's own classification of the disease into three groups:

(1) those without gross vascular lesion,

(2) those with gross vascular disease, and

(3) those that are characterized by the formation of large arteriovenous communications.

The author reports two cases which belong in group one. These are characterized by occurring mostly in children and more frequently in males than in females. Pathologically there is found chronic distension of the choroidal vascular system, which produces chronic congestion of the choroid, leading to subretinal and choroidal exudation. As the fluid increases, the inner layers of the retina become torn off and ballooned forward, producing a detachment. The glaucoma which occurs is due to venous thrombosis.

A. B. Bruner.

Perez Bufill. **Surgical treatment of detachment of the retina.** Arch. de Oft. Hisp.-Amer., 1929, v. 29, Mar., p. 150.

The author is partial to the theory of Leber, who admits that detachment of the retina is due to ruptures in the

membrane through which the vitreous flows out, separating the two membranes. These ruptures are due to traction upon the retina by condensation and fibrillation of the vitreous, originated by foci of choroiditis which produce adhesions between the retina and the choroid. Although the rupture cannot always be found it always exists. The rational treatment of detachment must be directed first to evacuation of the subretinal fluid and second to avoid its replacement. The author went to Lausanne to see Gonin perform his operation, and was able to follow many cases operated by Gonin, whose method consists in deep cauterization of the retina at the site of the tear in order to produce its obliteration and also fixation of the retina to the scar. After an injection of novocaine two percent the conjunctiva is divided three or four millimeters from the cornea and dissected free. The sclera is incised with a Graefe knife or is scarified until the subretinal liquid is evacuated. Through the hole the galvanocautery at dull red heat is introduced and the retina cauterized. The conjunctiva is sutured and the eye bandaged. The patient is kept quiet, with the head resting upon the operated side, for a period of six days, so that the vitreous may gravitate upon the wound.

The results of the operation have been gratifying not only in the cases that the author saw in Lausanne, but also in two cases that he himself operated upon. *M. Uribe Troncoso.*

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Chahbaz. **Atrophy of the optic nerve with adiposogenital syndrome.** Türk Oftalmoloji Gazetesi, 1929, v. 1, April, p. 123.

A boy aged sixteen years had all the typical signs of Fröhlich's syndrome, in addition to a bilateral optic atrophy. Radiographic examination revealed evidence of pituitary enlargement, and the author believes that optic atrophy had resulted from compression exerted by the enlarged hypophysis.

Phillips Thygeson.

Kubie, L. S. and Beckmann, J. W. **Diplopia without extraocular palsies, caused by heteronymous defects in the visual fields associated with defective macular vision.** Brain, 1929, v. 52, pt. 3, p. 317.

The occurrence of true diplopia without any weakness of the extraocular muscles is described in six cases of adenoma of the hypophysis and two cases of tumor of the hypophyseal stalk. In all of these cases there was a bitemporal hemianopia; in none of them was there a homonymous type of defect in the visual field. In some of the cases it was possible to demonstrate, and in others it was possible to infer from the histories, that visual acuity at the macula was less than that of the juxtamacular nasal field (i.e., the temporal retina). In certain cases it was clear that the diplopia was heteronymous, the images evidently arising from the nasal fields. In other cases the images were too close together, or too indistinct, to permit of such exact analysis. In no case was the diplopia increased by conjugate deviation of the eyes, but rather by efforts to focus both eyes for clearer binocular vision in any direction. In attempting to bring both nasal fields into focus there was a slight divergent strabismus in some cases. (Bibliography.)

Ralph W. Danielson.

Loddoni, Giovanni. **Case of annular scotoma from quinine.** Ann. d'Ocul., 1929, Sept., v. 166, pp. 733-742.

The author reports a case of quinine poisoning which had a relapse of loss of vision following a fall three months after the original blindness. Some discussion of the pathology is given but no satisfactory explanation of the annular scotoma. *Lawrence Post.*

Thomson, E. S. **Conditions of the optic nerve caused by disease of the sinuses.** Arch. of Otolaryng., 1929, v. 10, Sept., p. 248.

Thomson believes that many cases of inflammation of the optic nerve are due to sinus disease even though no

local signs can be found, and that good results are obtained by surgical intervention. Quoting his cases reported in the Laryngoscope in 1928, he says: "From this work it has become more and more evident that the nasal symptoms could not be depended on, and that it was important to study the symtoms in the eye so that a diagnosis of strong probability could be made and the operation on the sinuses could be requested on the condition of the eye alone".

The three types of disturbances due to sinus disease are described as retrobulbar neuritis, plastic neuritis, and functional depression with no changes in the appearance of the optic nerve. The surgery advised is a radical pansinus operation on the affected side, combined with submucous resection of the septum.

The author believes that in the functional types the diagnosis is mainly a question of differentiation between diseases of the sinuses and hysteria. Multiple sclerosis is dismissed with the statement that "there is no reason why in a case of multiple sclerosis there should not also be disease of the sinuses. As I see it, the only way to prove or disprove the relationship is to operate." A review of the literature since his report in 1926 is given. (Bibliography.) *Ralph W. Danielson.*

13. EYEBALL AND ORBIT

Alkin, O. G. **Two cases of echinococcus of the orbit.** Archiv Ophtalmologii (Russian), 1929, v. 6, parts 2-3, pp. 259-268.

In a case of extreme unilateral exophthalmos, the diagnosis of orbital echinococcus was suggested by the presence of a fluctuating cyst in the temporal part of the orbit, by a marked general eosinophilia, and by a positive Ithuratti reaction. The diagnosis was confirmed by operation.

In another case, a large mass in the orbit had caused extreme proptosis with loss of vision. A malignant new growth was diagnosed, and exenteration of the orbit was done. In the removed tissues, however, an echinococcus cyst was found.

M. N. Beigelman.

Burch, F. E. **The exophthalmos of Graves's disease.** Minnesota Med., 1929, v. 12, Nov., p. 668.

In this article the author reviews some of the eye signs of exophthalmic goiter and the theories for the occurrence of exophthalmos. A case is mentioned in which ocular symptoms occurred without other signs of goiter; also a remarkable case in which both eyes were lost from exophthalmos eighteen months after successful operation for goiter without any eye symptoms at the time of operation or during the interval. (Bibliography.)

Ralph W. Danielson.

Rowland, W. D. **Chronic purulent conjunctivitis from infecting prothesis —a case report.** Jour. Ophth., Otol., and Laryng., 1929, v. 23, Aug., p. 308.

The patient, a printer, had continuous profuse mucopurulent discharge from the left socket, the eye having been removed years before because of a burn. Medicinal treatment was of no avail, but the eye would improve somewhat when the prothesis was worn less. Six weeks after the first visit, it was noticed one day that the prothesis was two-thirds full of fluid. Cultures of the fluid by Dr. Sanford Gifford showed staphylococcus aureus, staphylococcus albus, and bacillus coli anærogenes. A new prothesis was ordered and a month later the socket was normal.

Ralph W. Danielson.

NEWS ITEMS

News items in this issue were received from Drs. Frank E. Burch, Saint Paul; C. A. Clapp, Baltimore; E. D. LeCompte, Salt Lake City; J. M. Patton, Omaha; and M. F. Weymann, Los Angeles. News items should reach **Dr. Melville Black**, Metropolitan building, Denver, by the twelfth of the month.

Deaths

Dr. Frank O. Reynolds, formerly of Logan, Utah, died in California recently.

Dr. Lee M. Willard, Wausau, Wisconsin, died November 14, 1929, aged sixty-one years, in a hospital at Cleveland.

Dr. David H. Coover of Denver died at his residence January tenth from a complication of kidney and acute pulmonic infection. Dr. Coover was one of the distinguished oculists of the West. He came to Denver from Harrisburg, Pennsylvania, forty years ago. Professor Fuchs told the writer that Dr. Coover was in his first class of ophthalmology in the seventies. (See obituary, page 162.)

Dr. Fritz Seydel of Breslau, Germany, recently died at the age of sixty years.

Dr. J. W. May, a very active member of the Kansas City Society of Ophthalmology and Otalaryngology, died recently.

Miscellaneous

The New York Association for the Blind recently received $26,170 under the will of the late Charles H. Ruhl.

The Lucien Howe prize, a medal and fifty dollars in cash, will be awarded for the best original contribution to the knowledge of surgery, preferably ophthalmology. Any physician may compete for this prize.

Dr. Fritz Sewdel of Breslau, Germany, recently obtained the degree of doctor of philology upon the basis of a work concerning Sanskrit (early Indian) literature on ophthalmology.

On January tenth the new Florence Crane building for diseases of the eye, ear, and throat was dedicated in Hartford, Connecticut. The building was presented by Mr. Richard T. Crane, Jr., and was officially accepted in behalf of the Hartford Hospital by Dr. Phineas Henry Ingalls. An address on "Some of the early eye and ear infirmaries in the United States, and the men who made them" was delivered by Dr. William Holland Wilmer.

During January, Professor Van der Hoeve of Leyden, Holland, delivered three lectures before the North of England Ophthalmological Society, on x-ray diagnosis in ophthalmology, strabismus, and tumors and pseudotumors of the eye and orbit.

The William Mackenzie medal for original work in ophthalmology of outstanding merit was presented for the year 1929 to Mr. W. S. Duke-Elder of London, at the Glasgow Eye Infirmary, on December 2, 1929. Mr. Duke-Elder delivered an address on "The clinical applications of the newer conceptions in the physiology of the eye."

The issue of Annales d'Oculistique (Paris) for November, 1929, contains a paper by Conrad Berens of New York, under the title "Diagnostic de l'élévation de la pression intracranienne en l'absence de stase papillaire, par l'étude de la pression arterielle retinienne" (diagnosis of elevation of intracranial pressure without papillary stasis by the study of retinal arterial pressure).

During the past year, under the guidance of Dr. Issac Jones as chairman of the committee, a study club has held regular meetings twice a week at the Eye and Ear hospital of Los Angeles. One meeting each week was devoted to ophthalmological subjects and the program consisted of a paper and review of the literature concerning one problem for each meeting. This was followed by general discussion, and it is felt that these programs have been of mutual benefit to all those participating in them.

Societies

At the annual dinner of the eye and ear section of the Los Angeles County Medical Society, held at the University Club on January sixth, Dr. A. Ray Irvine was installed as president for the coming year, Dr. F. H. Brant was made vice-president, and Dr. J. Frank Friesen retained his position as secretary for another year.

Dr. Conrad Berens of New York, as secretary-treasurer of the new organization, has issued a preliminary notice of the first scientific meeting of the Association for Research in Ophthalmology which will be held in Detroit, on Tuesday, June 24, 1930, the day before the meeting of the Section on Ophthalmology of the American Medical Association. There will be two sessions—the morning meeting at 9:30, and the afternoon meeting at 2:30. The subject to be discussed will be "Etiology of acute iritis." The following subjects have been considered as possible topics for future meetings: "Etiology of cataract"; "Etiology of chronic simple glaucoma"; "Early diagnosis of chronic simple glaucoma"; "Degenerative diseases of the eye." Information regarding men who are working on or are interested in special phases of the subjects suggested for discussion should be sent to the secretary-treasurer. (See also American Journal of Ophthalmology, 1930, January, page 57.)

Personals

Dr. Rafel Munex Isora of Caracas, Venezuela, inspected the Wilmer Institute recently.

Dr. Angus MacLean of Baltimore was married December twenty-eighth to Miss Eleanor Hodges.

Dr. Jonas Friedenwald of Baltimore has returned from several months' sojourn in London.

Dr. Joseph L. McCool, formerly of Portland, Oregon, has announced the opening of his offices in San Francisco.

Dr. Nelson Miles Black's removal to Miami (mentioned in the January issue) is for practice from January first to May thirtieth only.

Dr. Leo L. Mayer, formerly associated in Saint Louis, with Drs. H. L. Wolfner, Meyer Wiener, and B. Y. Alvis, has announced the opening of an office in Chicago.

Dr J. Hewitt Judd announces that he is associated with Drs. Gifford, Patton, Callfas, Potts, and Cassidy of Omaha, in ophthalmology.

Dr. Ward A. Holden has been appointed clinical professor of ophthalmology in the College of Physicians and Surgeons, Columbia University, New York.

Dr. Edward Jackson has been elected corresponding honorary member of the Section of Ophthalmology of the Royal Society of Medicine of London.

Dr. Edward W. Taylor of Boston addressed the New England Ophthalmological Society December seventeenth, on "Cerebral localization with reference to the eye."

Dr. William H. Wilder of Chicago addressed the Kansas City Society of Ophthalmology and Otolaryngology at their meeting on January sixteenth, and conducted a diagnostic clinic.

Since January first Dr. C. Dwight Townes of Louisville, Kentucky, has been associated with Dr. Adolph O. Pfingst in the practice of ophthalmology.

Dr. Sanford R. Gifford, Omaha, has assumed his duties as head of the department of ophthalmology at Northwestern University School of Medicine, Chicago.

Dr. E. M. Neher, who attended the "Fuchs course" in Vienna, comments on it thus: "The work was well organized, and a splendid review of the essentials of ophthalmology."

Dr. John W. Burke, Washington, D. C., has resigned as professor of ophthalmology at Georgetown University school of medicine, and has been succeeded by Dr. James N. Greear junior.

Dr. H. Wilson Levengood is again able to engage in active work, after having been kept from his office for some time by an attack of arthritis.

On account of the death of his father, Dr. Walter K. Slack has resigned as resident at the Presbyterian Eye, Ear, and Throat Charity Hospital, Baltimore, and has returned to his home in Saginaw, Michigan, to engage in practice.

Dr. Laura Lane has moved to Minneapolis from Baltimore, and is doing research work in ophthalmology at the University of Minnesota.

Dr. Earling Hanson of Minneapolis returned Christmas day from a trip abroad, during which he attended the International Congress and took the advanced graduate work in Vienna.

Dr. James P. Riggs, who has just returned from several months of study in European clinics, announces his association with the Grand Island clinic at Grand Island, Nebraska. He will have charge of the eye, ear, nose, and throat department.

Dr. Casey Wood is in Rome for the winter, where he is engaged in completing his study of fifteenth century publications on ophthalmology, and in supplementing his recent translation of Benevenutus Grassus' De Oculis with other treatises, to constitute a work on "Incunabula Ophthalmica."

The Burlington Gazette of Burlington, Iowa, in a genial editorial recently congratulated Dr. H. B. Young upon entering the fifty-first year of his career in the practice of medicine. As a matter of fact, Dr. Young has practiced medicine for fifty-five years and has been an ophthalmologist and otologist for fifty years.

A department of "Questions and Answers"

An announcement by Dr. Lawrence T. Post

It has always been the purpose of the American Journal of Ophthalmology to serve ophthalmologists in every way possible. To help do this the Journal has conducted a number of different departments, and the addition of one more is now contemplated.

Many ophthalmologists practice in communities where they are more or less isolated from their confrères and from libraries or other sources of recent information, and many others for one reason or another do not care to seek advice locally and have not the facilities for investigation of special problems.

From several such sources has come the suggestion that the Journal serve as intermediary for these physicians on questions of ophthalmological interest.

It has therefore been decided to initiate a department of questions and answers from which the inquiry will be referred to a source whence a satisfactory answer will most probably be forthcoming and the reply sent to the questioner. The Journal will publish those questions and answers which appear to be of sufficient general interest to warrant such action. No indication of the identity of the questioner will be given but the name of the physician answering will be published unless he requests otherwise.

We embark on this new undertaking with considerable diffidence, in the first place on account of a feeling of doubt as to the usefulness of the department, and in the second place because of uncertainty as to the possibility of conducting it in a satisfactory manner. A few months, however, will indicate whether the demand exists for this department and if such demand can be met.

Questions should be addressed to Dr. Lawrence Post, 524 Metropolitan Building, Saint Louis, Missouri.